IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of	)	
Norbert Wolters et al	)	Group: 3671
Serial No.: 09/727,134	)	
Filed: November 30, 2000	)	
Title: ROW INSENSITIVE GATHERING DEVICE FOR AN AGRICULTURAL HEADER	)	Examiner: Arpad F. Kovacs

LETTER

MS Appeal Brief-Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Enclosed herewith, is the Revised Appeal Brief Of Appellants in the above-identified patent application.

In the event Applicants have overlooked the need for an extension of time, an additional extension of time, payment of fee, or additional payment of fee, Applicants hereby conditionally petition therefor and authorizes that any charges be made to Deposit Account No. 20-0095, TAYLOR & AUST, P.C.

Respectfully submitted,

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Electronically filed May 10, 2007

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REVISED APPEAL BRIEF OF APPELLANTS

MS Appeal Brief-Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This appeal is taken from the decision of the Examiner, dated June 20, 2006, finally rejecting claims 1-7 and 20-24. Claims 8-13, 15 and 17-19 having been allowed. On August 31, 2006 an amendment to claim 8 was filed with the Patent Office, which was entered as indicated in the Advisory Action mailed on September 28, 2006. In response to the Final Office Action, Appellants filed a Notice of Appeal on August 31, 2006. On November 30, 2006 an Appeal Brief was filed. On January 5, 2007 an Office Communication was issued indicating that the Appeal Brief was non-complaint and should be amended. Responsive thereto, a revised Appeal Brief was filed on February 5, 2007. On April 10, 2007 a Notice of Non-Compliant Appeal Brief was issued having a time period for response of one month. Responsive thereto the present revised Appeal Brief is hereby submitted.

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I. REAL PARTY IN INTEREST

The real party in interest is Mashchinenfabrik Kemper GmbH & Co. KG (hereinafter Kemper) having its principal place of business in Breul, 48703 Stadtlohn, Germany. Kemper became the real party in interest by an assignment dated 15 November 2000 and recorded with the Patent Office on 30 November 2000, Reel 011358 Frame 0264.

II. RELATED APPEALS AND INTERFERENCES

The Board is directed to a previous appeal in the present case (Appeal 2005-0352) appealing the Examiner's final rejection of claims 1-7, 20 and 21. The Examiner's rejection of claims 1-4, 20 and 21 under 35 USC 102 was reversed. The Examiner's rejection of claims 5-7 was not argued by Appellants and was therefore sustained by the Board.

III. STATUS OF CLAIMS

Pending: 1-13, 15 and 17-24.

Canceled: 14 and 16.

Allowed: 8-13, 15 and 17-19.

Objected To: None.

Rejected: 1-7 and 20-24.

Withdrawn from Consideration: None.

On Appeal: 1-7 and 20-24.

A clean copy of claims 1-13, 15 and 17-24, all the pending claims, is included as an Appendix to this brief.

IV. STATUS OF AMENDMENTS

There are no un-entered outstanding amendments.

V. SUMMARY OF CLAIMED SUBJECT MATTER

The present invention relates generally to a feeding and picking device for an agricultural crop having a feeding element that has a vertical axis of rotation and is row insensitive.

Independent claims 1, 2 and 20 are reproduced below in annotated form, with reference numbers from the drawings inserted as well as citations to paragraphs from the detailed description section of the application. An abbreviated description of the feeding and picking devices, also with citations to paragraphs of the application, follows the annotated claims.

Annotated Claim 1 A feeding and picking device (10) *(see page 6, lines 9-15)* for feeding and picking a standing agricultural crop (54) *(see page 12, line 31)* wherein individual plants in the crop are provided with plant stalks (22) *(see page 7, line 16)*, the feeding and picking device (10) comprising a picking device (18, 20, 24 and 26) *(see page 8, lines 12-35)* and a rotating feeding element (14 or 16) *(see page 6, lines 16-28)* that is rotated in a circle about a vertical axis *(see page 6, lines 24 and 25)* and comprises a body (48 or 50) *(see page 6, line 29 through page 7, line 5)* with outwardly extending fingers (44 or 46) *(see page 6, line 29 through page 7, line 5)*, the rotating feeding element grasps plant stalks (22) *(see page 7, lines 16-34)* and directs the plant stalks to the picking device (18, 20, 24, and 26) *(see page 12, lines 29-33)* which separates useable parts from plant stalks (22), the picking device (18, 20, 24 and 26) having an effective length *(see page 2, lines 12-18)*, wherein rotating feeding element (14 or 16) is designed to transport the plant throughout the effective length of the picking device *(see page 3, lines 1 and 2)* and further wherein the picking device (18, 20, 24 and 26) is provided with an inlet *(see page 3, lines 29-31)*, the inlet being located in front of the vertical axis of the feeding element *(see page 8, lines 9 and 10)*.

Annotated Claim 2 A feeding and picking device (10) *(see page 6, lines 9-15)* for feeding and picking a standing agricultural crop (54) *(see page 12, line 31)* wherein individual plants in the crop are provided with plant stalks (22) *(see page 7, line 16)*, the feeding and picking device (10) comprising a picking device (18, 20, 24 and 26) *(see page 8, lines 12-35)* and a rotating feeding element (14 or 16) *(see page 6, lines 16-28)* that is rotated in a circle about a vertical axis *(see page 6, lines 24 and 25)* and comprises a body (48 or 50) *(see page 6, line 29 through page 7, line 5)* with outwardly extending fingers (44 or 46) *(see page 6, line 29 through page 7, line 5)*, the rotating feeding element (14 or 16) grasps plant stalks (22) *(see page 7, lines 16-34)* and directs the plant stalks to the picking device (18, 20, 24, and 26) *(see page 12, lines 29-33)* which separates useable parts from plant stalks (22), wherein the feeding element is designed to support the plant stalk (22) while it is being processed by the picking device (18, 20, 24 and 26), and further wherein the picking device (18, 20, 24 and 26) is provided with an inlet *(see page 3, lines 29-31)*, the inlet being located in front of the vertical axis of the feeding element *(see page 8, lines 9 and 10)*.

Annotated Claim 20 A crop harvesting machine having at least two feeding and picking devices (10 and 10'), (see page 11, line 28 through page 12, line 9) wherein each feeding and picking device (10) *(see page 6, lines 9-15)* feeds and picks a standing agricultural crop (54) *(see page 12, line 31)* wherein individual plants in the crop are provided with plant stalks (22) *(see page 7, line 16)*, the feeding and picking device (10) comprising a rotating feeding element (14 or 16) *(see page 6, lines 16-28)* that is rotated in a circle about a vertical axis *(see page 6, lines 24 and 25)* and comprises a body (48 or 50) *(see page 6, line 29 through page 7, line 5)* with outwardly extending fingers (44 or 46) *(see page 6, line 29 through page 7, line 5)*, the rotating feeding element grasps plant stalks (22) *(see page 7, lines 16-34)* and directs the plant stalks (22)

to the picking device (18, 20, 24, and 26) *(see page 12, lines 29-33)* which separates useable parts from plant stalks (22), the picking device having an effective length *(see page 2, lines 12-18)*, wherein the rotating feeding element is designed to transport the plant throughout the effective length of the picking device *(see page 3, lines 1 and 2)* and further wherein the picking device (18, 20, 24 and 26) is provided with an inlet *(see page 3, lines 29-31)*, the inlet being located in front of the vertical axis of the feeding element *(see page 8, lines 9 and 10)*.

A. DESCRIPTION OF THE ELEMENTS OF THE FOREGOING CLAIMS

The effective length is the portion of the length of the picking device in which the picking device processes the plant, i.e., draws it in and separates the useful parts from the rest of the plant. As a rule, this effective length runs at right angles to the direction in which the picking device draws in the plant. (Page 2, lines 12-14)

FIG. 1 illustrates a feeding and picking device 10 of a crop-harvesting machine. Typically, a crop harvesting machine 12, as shown in FIG. 4, comprises a plurality of feeding and picking devices 10; although, a crop harvesting machine 12 may be fitted with a single feeding and picking device 10. The feeding and picking device 10 comprises an upper feeding element 14, a lower feeding element 16, a rotary cutting knife 28, a first snapping roll 18, a second snapping roll 20, and a snapping channel 26 formed by snapping bars 24. (Page 6, lines 9-15)

The upper feeding element 14 and the lower feeding element 16 grasp and draw the plant to be harvested into the crop-harvesting machine 12. These elements 14 and 16 are rotatably mounted on a vertical axis and rotate in the same direction by a drive, not shown. The upper feeding element 14 is mounted above the snapping bar 24, and the lower feeding element 16 is

mounted beneath the snapping bar 24. In the illustrated embodiments, the axes of rotation of the upper feeding element 14 and the lower feeding element 16 are parallel to one another and coaxial with one another. The axes of rotation of the lower feeding element 16 and the upper feeding element 14 are substantially vertical, but they may also be tilted slightly forward. Looking at the upper feeding element 14 and the lower feeding element 16 from the top as shown in FIG. 1, the two elements rotate in the clockwise direction. The elements 14 and 16 are rotated at the same speed. (Page 6, lines 16-28)

The basic design of the upper feeding element 14 comprises a central disk 48 having substantially radially extending fingers 44. These fingers 44 are distributed along the periphery of the disk in the same plane of the disk 48. Fingers 44 have a trailing curvature curving away from the direction of rotation. As an alternative to or in addition to the curvature of fingers 44, it is also conceivable for the fingers to move radially, such as used on harvesting platforms, which can be achieved by an eccentric control. The lower feeding element 16 is also constructed to comprise a central disk 50 having substantially radially extending fingers 46. These fingers 46 are distributed along the periphery of the disk in the same plane as the disk 50. Fingers 46 have a leading curvature curving forward into the direction of rotation. The fingers 46 of the lower element 16 provide a more aggressive transporting action by better grasping the plant stalks than the fingers 44 of the upper element 14. (Page 6, line 29 through Page 7, line 5)

The lower feeding element 16 cooperates with the upper feeding element 14 to move the plant stalk 22 into the radius of action of the first snapping roll 18. The first snapping roll 18 is on the other side of the snapping channel 26 from the feeding elements 14 and 16. The first snapping roll 18 extends horizontally and parallel to the direction of forward travel V. Vertically, the first

snapping roll 18 is mounted between snapping bar 24 and the lower feeding element 16. The front region of the first snapping roll 18 is provided with auger flighting. The auger flighting and the feeding elements 14 and 16, draw the plant stalk 22 into the snapping channel 26 which extends at least approximately parallel to the direction of forward travel V. The snapping bar 24 forms the snapping channel 26. Relative to the direction of forward travel V, the inlet of the snapping channel is located in front of the axis of rotation of feeding elements 14 and 16. The rear region of snapping channel 26 is curved towards the feeding elements 14 and 16. (Page 7, line 35 through Page 8, line 11)

The plant stalk 22 subsequently reaches the radius of action of the second snapping roll 20. The front tip of the second snapping roll is located approximately even with the axis of rotation of feeding elements 14 and 16. The second snapping roll 20 extends parallel to the first snapping roll 18. The second snapping roll is positioned between the first snapping roll 18 and the axis of rotation of feeding elements 14 and 16. The gap formed between the first and second snapping rolls 18 and 20 is located vertically beneath the snapping channel 26. The first snapping roll 18 and the second snapping roll 20 are provided with axially arranged, outward projecting gripping flutes 52, best illustrated in FIG. 3. Referring to FIG. 3, the first snapping roll 18 rotates in a clockwise direction and the second snapping roll 20 rotates in a counterclockwise direction. The first snapping roll 18 and the second snapping roll 20 cooperate and pull the plant stalk 22 downwardly. Snapping bar 24 on both sides of snapping channel 26 strips the plant stalk 22 of its useful parts, such as ears of corn 54 (see FIG. 6). (Page 8, lines 12-24)

During the picking process, the upper feeding element 14 and the lower feeding element 16 ensure that the plant stalk 22 is transported throughout the length of snapping channel 26. As

described earlier, the plant stalk 22 is initially caught in the wedge-type space that is formed by a finger 44 of the upper feeding element 14 and a finger 46 of the lower feeding element 16. For the major portion of the picking process, the plant stalk 22 remains in this wedge-type space. A chopping knife 28 chops the plant stalk 22 in the downstream end of snapping channel 26. The plant stalk 22 is driven by the following finger 44 of the upper feeding element 14 through snapping channel 26. The speeds of snapping rolls 18 and 20 and of feeding elements 14 and 16 are preferably chosen to ensure that the entire plant stalk 22 has been drawn downward into snapping channel 26 once the end of snapping channel 26 is reached. (Page 8, lines 25-35)

FIG. 4 shows an overall view of a crop harvesting machine 12 with a total of six feeding and picking devices 10 each of which correspond to those shown in FIGS. 1 through 3. The sole difference being that the length of fingers 44 of the upper feeding element 14 (at least approximately) corresponds to the length of fingers 46 of lower feeding element 16. Relative to the direction of forward travel V, all snapping channels 26 are mounted on the right side of the axes of rotation of feeding elements 14 and 16. Screw conveyer 38 transports the useful parts of plant 22 in the direction of the center axis M of crop harvesting machine 12, from where they are transported elsewhere for further processing. It can therefore be useful if a feederhouse of a combine harvester or the feeding region of a field shredder were to be attached to the rear end of crop harvesting machine 12. The useful feature of the embodiment shown here is that all feeding and picking devices 10 have the same construction, which keeps the production cost low. (Page 9, lines 20-31)

FIG. 8 shows a crop-harvesting machine 12 with six feeding and picking devices 10. In this embodiment, the snapping channels 26' extend at an angle relative to the direction of forward

travel V. The first snapping roll 18 and the second snapping roll 20 form an angle with the direction of forward travel V. The gap formed by the adjoining snapping rolls 18 and 20 is located under snapping channel 26'. Longitudinal axis L of snapping channel 26' forms an angle with an imaginary straight line G which extends parallel to the direction of forward travel V and through the axis of rotation of the upper feeding element. The point of intersection of longitudinal axis L with straight line G being located in front of the axis of rotation of the upper feeding element. In the snapping channel 26', plant stalks 22 are gradually transported away from straight line G. As a result of the angled snapping channel 26', the plant stalks 22 are not only transported rearwardly but also laterally. The effective length of snapping channel 26' remains the same, except that the overall length of feeding and picking device 10 is shortened, which has the advantage that the torsional force with which crop harvesting machine 12 acts upon the vehicle to which it is attached is reduced. The rear of the otherwise straight snapping channel 26', however, is again curved in the direction of straight line G. (Page 11, lines 5-20)

The crop-harvesting machine 12 that is shown in FIG. 9 has two different types of feeding and picking devices 10. The left three feeding and picking devices 10' mounted to the left of the center line M are symmetrically arranged with respect to the right three feeding and picking devices 10 that are mounted to the right of center line M. In each of the three left feeding and picking devices 10', the snapping channel 26 is located to the left of the upper feeding elements 14. In each of the three right feeding and picking devices 10 the snapping channel is located to the right of the upper feeding elements 14. Relative to centerline M, all other structural elements of feeding and picking devices 10 and 10' are symmetrically arranged with respect to one another. The feeding and picking devices 10 correspond to those shown in FIG. 8. The feeding elements 14 and 16 for the right feeding and picking devices 10 rotate in a clockwise direction. The feeding

elements 14 and 16 for the left feeding and picking devices 10' rotate in a counterclockwise direction. As with the embodiment illustrated in FIG. 5, the advantage of a symmetrical arrangement of the feeding and picking devices is that the masses on both sides of the center line are uniformly distributed, thus ensuring that no undesirable torsional forces act on the vehicle to which crop harvesting machine 12 is attached. (Page 11, line 28 through Page 12, line 8)

When the plant is in the snapping channel, it is driven by the leading edge of the following finger 44 of feeding element 14 throughout the length of snapping channel 26. The useful parts of the plant, such as ears of corn 54, are separated by snapping bar 24 and, through the action of feeding element 14, transported to trough 38, from whence screw conveyer 36 transports them to a harvester vehicle. (Page 12, lines 29-33)

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

1. Whether claims 1-7 and 20-24 are unpatentable over PCT filing WO 99/03323 (Wiegert) in view of U.S. Patent No. 2,777,267 (Thompson) and Great Britain Patent No. GB 2012154 (Pottinger et al.).

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VII. ARGUMENT

A. CLAIMS 1-7 AND 20-24 ARE PATENTABLE OVER THE COMBINATION OF WIEGART IN VIEW OF THOMPSON AND POTTINGER ET AL..

Previous Appeal and Background

To properly frame this appeal, a brief review of the previous Appeal (Ex parte Wolters et al., Decision 2005-0352, 02-11-2005) is appropriate.

The Board reversed the Examiner's rejection of claims 1-4 and 20-21 under 35 USC 102 based on the same Wiegert reference [WO 99/03323], saying:

> [C]hopping unit 21 of Wiegert does not **grasp** plant stalks and direct the plant stalks **to a picking device**. Likewise the feed chains 18, 19 of Wiegert do not **grasp** plant stalks and direct the plant stalks to a picking device. (Emphasis in the original.)

See Wolters, page 4.

The Board sustained the Examiner's rejection of claims 5-7 under 35 USC 103 based on Wiegert in view of the same Thompson [US 2,777,267] and Pottinger [GB 2012154A] references, saying:

> The appellants have ***not specifically contested*** this rejection in the brief apart from these claims dependency from claim 1. … Accordingly, ***we summarily sustain*** the rejection of claims 5-7 under 35 U.S.C. § 103. (Emphasis added)

See Wolters, page 5.

In subsequent prosecution (and perhaps sensing partial approval by the Board) the Examiner expanded his Section 103 rejection of claims 5-7 to an identical Section 103 final rejection of claims 1-7 and 20,21 as well as new claims 22-24), finally rejecting them on 06/20/2006.

It is from this final Office Action (06/20/2006) which was based upon the identical

references considered in the original BPAI decision that we hereby appeal.

In the final Office Action the Examiner finally rejected pending claims 1-7, and 20-24, under 35 USC 103, as being unpatentable over Wiegert in view of Thompson and Pottinger.

Regarding independent claims 1, 2 and 20, The examiner's position is that Wiegert discloses a feeding and picking device for a standing crop wherein the feeding device comprises a rotating feeding element (fig. 4, item 20) that allegedly (1) rotates about a vertical axis in a circle and comprises (2) a body with outwardly-extending fingers) (Final Office Action, page 3).

The examiner stated that Wiegert did not "show or list the claimed alternative feeding device which grasps plant stalks as claimed", but that Wiegert discloses "the fact that the ***feeding element can be substituted by any other known device***" (emphasis added) citing the US equivalent of Wiegert -- US 6412259 -- at col. 2, lines 32-33 to support this substitution.

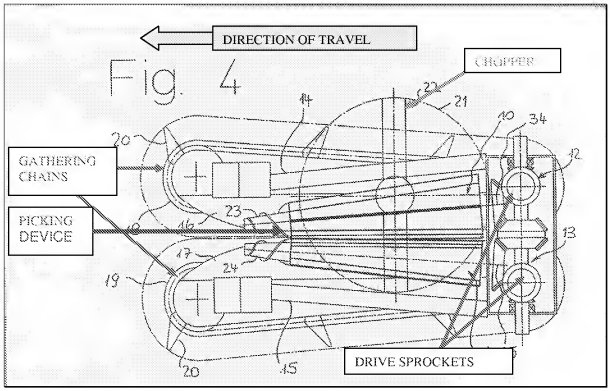
The Examiner stated (Final Office Action, page 4) that Thompson discloses such "known devices" for conveying stalks in Figs. 1-2, [i.e. axle 32 and fingers 37] as does Pottinger in Figs. 2 and 4 [i.e. wheels 1,2 and tines 10]. See also Pottinger, page 3, lines 114-115 and Fig. 1.

The Examiner stated (Final Office Action page 5) that it would be obvious to "provide the feeding device of Wiegert [i.e. item 20] with the alternative feeding device taught by Pottinger and/or Thompson, in order to improve the lifting actions and support on stalks which may have been leaned forwardly by the agricultural harvester."

The Examiner provided no citation for this alleged teaching.

Wiegert, Fig. 4:

(top view)



First consideration:

There is no teaching to combine the Thompson and Pottinger references with the Wiegert reference.

First, the Examiner said "the [Wiegert] feeding element can be ***substituted*** by any other known device". He says this is found on page 4, second paragraph of Wiegert. However, the translated language in Wiegert's US equivalent at col. 2, lines 34, 38 says "[t]he ***chopper*** shown has rotating blades 22; however it may also have any different combination." The language is the same in the German Wiegert WO 99/03323 reference.

Wiegert's "chopper" with "blades 22" is not the Examiner's "feeding element" however.

The Examiner, calls Wiegert's catches 20 a "feeding element" instead. It is therefore moot what Wiegert teaches as alternatives to chopper with blades 22.

Second, the Examiner summarily states that "[i]t would have been obvious … to provide the feeding device of Wiegert with the alternative taught by either Pottinger or Thompson, in order to improve the lifting actions and support on stalks which may have been leaned forwardly by the agricultural harvester.

The Examiner identifies no support for this statement. None of the references speak of the risk of an agricultural harvester pushing down crop. It is impermissible hindsight based upon the Appellants' own teachings.

Second consideration:

Neither Wiegert's catches (ref. 20) nor the gathering chains 18, 19 on which the catches are mounted constitute a rotating feeding element that is "**rotated in a circle about a vertical axis"** and comprises "**a body with outwardly extending fingers"** as alleged by the Examiner**.** Instead, the links in the chain and the catches extending therefrom follow a straight line path over their entire working distance with the tip of each catch extending a very slight distance into the stripper plate gap to support the corn stalk from either side. This is a standard gathering chain arrangement known and used on almost all row units. The catches 20 and the links of the gathering chains briefly follow a curved path merely to recirculate back to the front of the row unit. They travel a perfectly straight path where they engage the plant above the Wiegert stalk rolls

Third consideration:

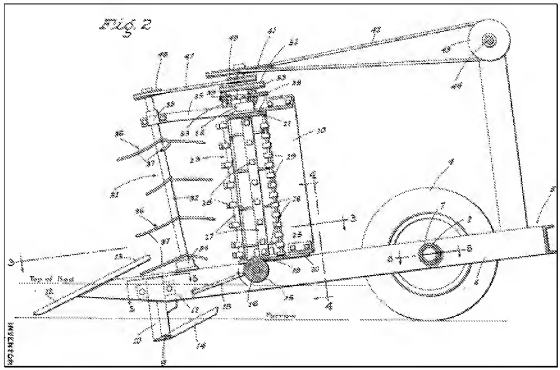
Neither Wiegert, Thompson nor Pottinger teach a "feeding element" that **"transport[s]**

the plant throughout the effective length of the picking device", wherein the "**picking device … separates the useable parts from the plant stalk**".

While Wiegert's catches 20 contact the plant stalks throughout the effective length of Wiegert's stalk rolls, they do not "**rotate**" in a "**circle**" about an "**axis**" during that transport. Instead, they follow a straight line path down opposite sides of the gap between the Wiegert stalk rolls (Wiegert's picking device).

Thompson, Fig. 2::

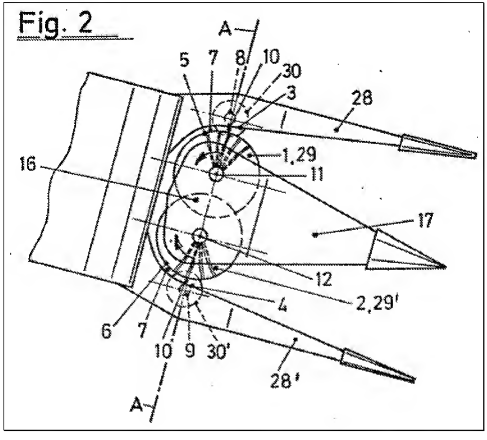
(side view)

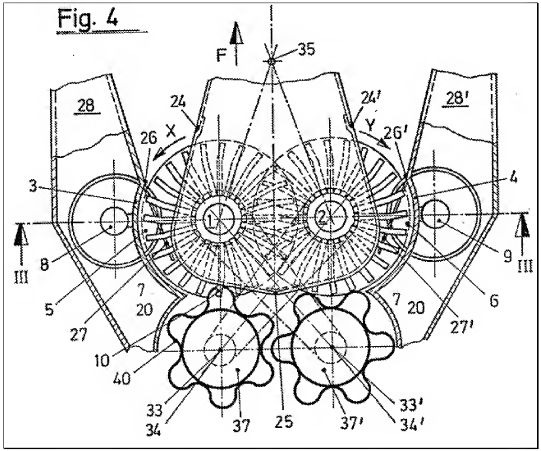


Thompson (see the figure above) has two generally vertical shafts 32 from which fingers 37 extend, that are disposed completely in front of two generally vertical shredder cylinders 23. The cylinders are not a "**picking device**" since the Thompson system is used to shred cotton plant stalks after the cotton crop has already been picked and separated. See Thompson, col. 1, lines 15-20. Assuming, arguendo, the cylinders 23 *are* a "picking device", nonetheless, the shafts 32

and fingers 37 do not support the plant stalk **"throughout the effective length"** of the shredder cylinders 23.

Pottinger, Figs. 2 and 4 (top views):





Pottinger teaches an apparatus for picking up, cutting off and conveying stalked plants to the infeed of a harvesting machine such as a maize chopper (not shown). See the Pottinger Abstract.

Pottinger has two pickup wheels 1, 2 with tines 10 that contact the plant as it moves across cutters 30, 30'. Any **"picking device which separates useable parts from plant stalks"** (claims 1, 2, 20) are not disclosed in Pottinger. If they did exist, however, they would be located well to the rear of Pottinger pickup wheels 1, 2 and tines 10, i.e. behind pickup drums 37, 37' (Fig. 4), conveyor belt 38 (Fig. 10) or conveyor screw 39 (Fig. 1).

Fourth consideration:

Neither Wiegert,Thompson nor Pottinger disclose a "**feeding element**" "**support[ing] the**

plant stalk while it is being processed by the picking device". As mentioned in the foregoing section, Wiegert's catches 20 cannot be the claimed feeding element since they do not "**rotate**" is a "**circle**" about an "**axis**". Thompson and Pottinger shown no "picking device" at all. Thompson's axles 32 plus fingers 37 and Pottinger's wheels 1,2 plus tines 10 are ahead of any device in the plant flow path that might conceivably be a "**picking device**" that "**separates useable parts from plant stalks**" and thus do not teach the claimed "**support**".

Fifth consideration:

Finally, neither Wiegert, Thompson or Pottinger disclose a "**picking device … with an inlet … located in front of the vertical axis of the feeding element**".

In Wiegert, the inlet of the two feed rolls is behind the vertical axis of catch 20. Alternatively, since catch 20 does not rotate in the feeding element's claimed "**circle**", catch 20 has no vertical "**axis**" of rotation at all that a Wiegert inlet could be located in relation to.

Since Thompson has no "**picking device which separates useable parts from plant stalks**", Thomson has no picking device "**inlet**" that a Thompson "**axis**" could be located in relation to.

Since Pottinger has no **"picking device which separates useable parts from plant stalks"** Pottinger has no picking device "**inlet**" that a Pottinger "**axis**" could be located in relation to.

CONCLUSION

For the foregoing reasons, Appellants submit that claims 1, 2 and 20 and all claims depending therefrom are neither taught, nor suggested by the cited references, alone or in combination, and claims 1-7 and 20-24 are therefore in condition for allowance in their present

form. Accordingly, Appellants respectfully request the Board to reverse the final rejection of the appealed claims.

Respectfully submitted,

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Electronically filed May 10, 2007

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VIII. CLAIMS APPENDIX

1. A feeding and picking device for feeding and picking a standing agricultural crop wherein individual plants in the crop are provided with plant stalks, the feeding and picking device comprising a picking device and a rotating feeding element that is rotated in a circle about a vertical axis and comprises a body with outwardly extending fingers, the rotating feeding element grasps plant stalks and directs the plant stalks to the picking device which separates useable parts from plant stalks, the picking device having an effective length, wherein rotating feeding element is designed to transport the plant throughout the effective length of the picking device and further wherein the picking device is provided with an inlet, the inlet being located in front of the vertical axis of the feeding element.

2. A feeding and picking device for feeding and picking a standing agricultural crop wherein individual plants in the crop are provided with plant stalks, the feeding and picking device comprising a picking device and a rotating feeding element that is rotated in a circle about a vertical axis and comprises a body with outwardly extending fingers, the rotating feeding element grasps plant stalks and directs the plant stalks to the picking device which separates useable parts from plant stalks, wherein the feeding element is designed to support the plant stalk while it is being processed by the picking device, and further wherein the picking device is provided with an inlet, the inlet being located in front of the vertical axis of the feeding element.

3. A feeding and picking device as defined by claim 1 wherein the picking device is provided with a snapping channel, the feeding element covers the snapping channel.

4. A feeding and picking device as defined by claim 3 wherein gaps are formed between the outwardly extending fingers, plant stalks are captured in the gaps, the gaps are sufficiently deep to ensure that they pass over the snapping channel of the picking device.

5. A feeding and picking device as defined by claim 4 wherein the feeding and picking device is provided with two rotating feeding elements, an upper feeding element and a lower feeding element, the upper feeding element has a direction of rotation, the upper feeding element is provided with outwardly extending fingers that are curved away from the direction of rotation.

6. A feeding and picking device as defined by claim 5 wherein the lower feeding element is located beneath the upper feeding element.

7. A feeding and picking device as defined by claim 6 wherein the lower feeding element has a direction of rotation that is identical to the direction of rotation of the upper feeding element.

8. A feeding and picking device for feeding and picking a standing agricultural crop wherein individual plants in the crop are provided with plant stalks, the feeding and picking device comprising a rotating feeding element that is rotated in a circle about a vertical axis and comprises a body with outwardly extending fingers, the rotating feeding element grasps plant stalks and directs the plant stalks to a picking device which separates useable parts from plant stalks, the picking device having an effective length, wherein the rotating feeding element is designed to transport the plant throughout the effective length of the picking device, wherein the picking device is provided with a snapping channel, the feeding element covers the snapping

channel, wherein gaps are formed between the outwardly extending fingers, plant stalks are captured in the gaps, the gaps are sufficiently deep to ensure that they pass over the snapping channel of the picking device, wherein the feeding and picking device is provided with two rotating feeding elements, an upper feeding element and a lower feeding element, the upper feeding element has a direction of rotation, the upper feeding element is provided with outwardly extending fingers that are curved away from the direction of rotation, wherein the lower feeding element is located beneath the upper feeding element, wherein the lower feeding element has a direction of rotation that is identical to the direction of rotation of the upper feeding element, and wherein the lower feeding element is provided with outwardly extending fingers that are curved towards the direction of rotation.

9. A feeding and picking device as defined by claim 8 wherein the picking device is mounted on the side of the feeding element.

10. A feeding and picking device as defined by claim 9 wherein the picking device is provided with an inlet, the inlet being located in front of the vertical axis of the feeding element.

11. A feeding and picking device as defined by claim 10 wherein the lower feeding element has a lower element diameter and the upper feeding element has an upper element diameter, the lower element diameter is smaller than the upper element diameter.

12. A feeding and picking device as defined by claim 10 wherein the lower feeding element has a lower element diameter and the upper feeding element has an upper element diameter, the lower element diameter is equal to the upper element diameter.

13. A feeding and picking device as defined by claim 10 wherein the lower feeding element is provided with a lower vertical axis and the upper feeding element is provided with an upper vertical axis, the lower vertical axis and the upper vertical axis are coaxial.

14. (Canceled).

15. A feeding and picking device as defined by claim 10 wherein the upper feeding element has the same number of fingers as the lower feeding element.

16. (Canceled).

17. A feeding and picking device as defined by claim 10 wherein the picking device further comprises a snapping bar and at least one snapping roll, the at least one snapping roll extends parallel to the snapping channel and is mounted under said snapping bar.

18. The feeding and picking device as defined by claim 17 wherein said feeding and picking device has a direction of travel, the snapping channel extends parallel to the direction of travel.

19. The feeding and picking device as defined by claim 17 wherein said feeding and picking device has a direction of travel, the snapping channel extends at an angle to the direction of travel.

20. A crop harvesting machine having at least two feeding and picking devices, wherein each feeding and picking device feeds and picks a standing agricultural crop wherein individual plants in the crop are provided with plant stalks, the feeding and picking device comprising a rotating feeding element that is rotated in a circle about a vertical axis and comprises a body with outwardly extending fingers, the rotating feeding element grasps plant stalks and directs the plant stalks to the picking device which separates useable parts from plant stalks, the picking device having an effective length, wherein the rotating feeding element is designed to transport the plant throughout the effective length of the picking device and further wherein the picking device is provided with an inlet, the inlet being located in front of the vertical axis of the feeding element.

21. A crop harvesting machine as defined by claim 20 having a symmetrical line, feeding and picking devices are symmetrically arranged with respect to each other about the symmetrical line.

22. The crop harvesting machine of claim 1, wherein the picking device comprises two stalk rolls having forward ends, and further wherein the axis is located behind and to the side of the two forward stalk roll ends.

23. The crop harvesting machine of claim 2, wherein the picking device comprises two stalk rolls having forward ends, and further wherein the axis is located behind and to the side of the two forward stalk roll ends.

24. The crop harvesting machine of claim 20, wherein the picking device comprises two stalk rolls having forward ends, and further wherein the axis is located behind and to the side of the two forward stalk roll ends.

IX. EVIDENCE APPENDIX

Appended to this brief are copies of the three references: Wiegert (WO 99/03323), the US counterpart of Wiegert (US 6412259), Thompson (US 2,777,267) and Pottinger (GB 2012154) all cited in the Examiner's Final Office Action mailed 06/20/2006.

RELATED PROCEEDINGS APPENDIX

Appended to this brief are copies of the earlier decision in this application that was earlier referred to in the brief:

Ex parte Wolters et al., Decision 2005-0352, 02-11-2005.

PCT WELTORGANISATION FÜR GEISTIGES EIGENTUM
Internationales Büro
INTERNATIONALE ANMELDUNG VERÖFFENTLICHT NACH DEM VERTRAG ÜBER DIE
INTERNATIONALE ZUSAMMENARBEIT AUF DEM GEBIET DES PATENTWESENS (PCT)

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(81) Bestimmungsstaaten: CA, HU, US, europäisches Patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).

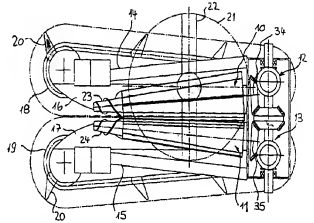
Veröffentlicht
Mit internationalem Recherchenbericht.
Vor Ablauf der für Änderungen der Ansprüche zugelassenen Frist; Veröffentlichung wird wiederholt falls Änderungen eintreffen.

(54) Title: APPARATUS FOR HARVESTING MAIZE

(54) Bezeichnung: GERÄT ZUM ERNTEN VON MAIS

(57) Abstract

The invention relates to an apparatus for harvesting maize or similar cereals, which can be configured especially as an attachment for combine harvesters (2) or field harvester and comprises two picking rollers (10, 11) mounted on either side of a picking slot (31) for separating the ears from the part of the plant carrying said ears. The picking rollers are driven to rotate about axes (34, 35) pointing in the direction of displacement (F) of the apparatus (1) and comprise several longitudinal ridges (29, 30), ribs or similar protuberances which form working edges (27, 28) projecting beyond the basic roller body (25, 26). The working edges (27, 28) of the picking rollers (10, 11) distributed around the circumference of the basic roller body (25, 26) extend across working surfaces which narrow conically towards the front end of the picking rollers (10, 11) and with each other or with the basic roller body (25, 26) of the neighbouring picking roller define a through-slot (36). To improve the picking action the axes of rotation (34, 35) of the picking rollers (10, 11) are arranged in such a way as to converge towards the front ends of the picking rollers (10, 11).



(57) Zusammenfassung

Das Gerät zum Ernten von Mais od.dgl. Körnerfrüchten, das insbesondere als Vorsatzgerät für Mähdrescher (2) oder Feldhäcksler ausgebildet sein kann, ist mit zwei beidseits eines Pflückspaltes (31) zur Trennung des Fruchtstandes von dem diesen tragenden Pflanzenteil angeordneten Pflückwalzen (10, 11) versehen, die um in Fahrtrichtung (F) des Geräts (1) weisende Drehachsen (34, 35) angetrieben umlaufen und mit mehreren längslaufenden, über ihren Walzengrundkörper (25, 26) vorstehende Arbeitskanten (27, 28) ausbildenden Stegen (29, 30), Rippen od.dgl. Vorsprüngen versehen sind. Die über den Umfang der Walzengrundkörper (25, 26) verteilt angeordneten Arbeitskanten (27, 28) der Pflückwalzen (10, 11) durchlaufen sich zum Frontende der Pflückwalzen (10, 11) hin konisch verjüngende Arbeitsflächen und begrenzen miteinander oder mit dem Walzengrundkörper (25, 26) der jeweils benachbarten Pflückwalze einen Durchgangsspalt (36). Zur Verbesserung der Pflückarbeit sind die Drehachsen (34, 35) der Pflückwalzen (10, 11) zu den Frontenden der Pflückwalzen (10, 11) hin konvergierend ausgerichtet.

LEDIGLICH ZUR INFORMATION

Codes zur Identifizierung von PCT-Vertragstaaten auf den Kopfbögen der Schriften, die internationale Anmeldungen gemäss dem PCT veröffentlichen.

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Gerät zum Ernten von Mais

Die Erfindung bezieht sich auf ein Gerät zum Ernten von Mais o. dgl. Körnerfrüchten, insbesondere Vorsatzgerät für Mähdrescher oder Feldhäcksler in einer Ausbildung gemäß dem Oberbegriff des Anspruchs 1.

Bei einem bekannten Gerät dieser Art (DE-B-17 57 213) haben die Pflückwalzen parallel zueinander ausgerichtete Drehachsen. Die Konizität der Arbeitsflächen der Pflückwalzen schafft dementsprechend einen Durchgangsspalt, der sich zum rückwärtigen Basisende der Pflückwalzen hin in der Breite verringert.

Bei einem anderen bekannten Gerät (DE-A-20 00 140, FR-A-1 268 615) haben die Pflückwalzen zylindrische Arbeitsflächen. Die Drehachsen der Pflückwalzen divergieren zum Frontende der Pflückwalzen hin, so daß hierdurch ebenfalls ein Durchgangsspalt gebildet wird, der sich zu seinem rückwärtigen Ende hin in der Breite verringert.

Bei einem weiterhin bekannten Gerät (DE-C-39 18 362) haben die Pflückwalzen zylindrische Arbeitsflächen und untereinander parallel ausgerichtete Drehachsen und dementsprechend einen über seine Länge gleichbleibend breiten Durchtrittsspalt. Zur Zerkleinerung der geernteten Halme kann dabei unterhalb der Pflückwalzen eine Schneidvorrichtung mit beispielsweise einem rotierenden Schneidmesser vorgesehen sein.

Die Erfindung befaßt sich mit dem Problem ein Erntegerät der eingangs genannten Art zu schaffen, das unter Minderung des Verschleißes an den

Pflückwalzen im vorderen Bereich des Durchgangsspaltes einen das Erntegut besonders schonenden Pflückvorgang verwirklicht.

Die Erfindung löst dieses Problem durch eine Erntemaschine mit den Merkmalen des Anspruchs 1. Hinsichtlich wesentlicher weiterer Ausgestaltungen wird auf die Ansprüche 2 bis 9 verwiesen.

Durch die zu den Frontenden der Pflückwalzen hin konvergierende Ausrichtung der Drehachsen der Pflückwalzen kann unter Beibehaltung einer gewünschten Konfiguration des Durchgangsspaltes die Konizität der Pflückwalzen unter dem Gesichtspunkt der Vorgabe einer gewünschten Durchzugsgeschwindigkeit für das Erntegut durch den Durchgangsspalt und deren Anstieg zum Abgabeende des Durchgangsspaltes hin frei gewählt werden. Dementsprechend kann den Pflückwalzen am frontseitigen Einlaufende des Durchgangsspaltes ein verhältnismäßig geringer Durchmesser mit entsprechend niedriger Umfangsgeschwindigkeit bei Umlauf im Betrieb vorgegeben werden, so daß die Einwirkung auf die Halme des Erntegutes bei Beginn des Durchzuges schonend einsetzt und das Eintreten von Schlupf mit der Verschleißfolge an den frontseitigen Enden der Pflückwalzen herabgesetzt ist. In Abstimmung mit dem Konvergenzwinkel der Drechachsen kann den Pflückwalzen ein Konuswinkel vorgegeben werden, der eine verhältnismäßig starke Vergrößerung des Durchmessers des Arbeitskreises der Pflückwalzen, die mit einem starken Anstieg der Umfangsgeschwindigkeit der Arbeitsfläche der Pflückwalzen zum Abgabeende des Durchgangsspaltes hin einhergeht, zur Folge hat. Dieser Geschwindigkeitsanstieg, der bevorzugt etwa 50 % beträgt, erlaubt bei schonender Pflückung eine Erhöhung der Erntegeschwindigkeit oder bei Beibehaltung der Erntegeschwindigkeit eine kürzere Ausführung der Pflückwalzen.

Weitere Einzelheiten und Wirkungen ergeben sich aus der nachfolgenden Beschreibung und der Zeichnung, in der ein Ausführungsbeispiel des Gegen-

stands der Erfindung schematisch näher veranschaulicht ist. In der Zeichnung zeigen:

Fig. 1 eine Seitenansicht eines Mähdreschers mit einem Erntegerät nach der Erfindung als Vorsatzgerät,

Fig. 2 eine Draufsicht auf das Erntegerät gemäß Fig. 1,

Fig. 3 eine Seitenansicht des Erntegerätes in Vergrößerung,

Fig. 4 eine Pflückeinheit des Erntegerätes nach Fig. 2, von unten gesehen,

Fig. 5 eine Seitenansicht zu Fig. 4, und

Fig. 6 eine Frontansicht zu Fig. 4.

Fig. 1 veranschaulicht ein Gerät 1 zum Ernten von Mais o. dgl. Körnerfrüchten, das ein Vorsatzgerät für einen Mähdrescher 2 bildet, jedoch auch mit einem Feldhäcksler kombiniert werden oder als unabhängige Baueinheit, z.B. als Anbaugerät, Anwendung finden kann. Bei dem dargestellten Ausführungsbeispiel ist das Erntegerät einem Förderer 3 vorgeordnet, der das Erntegut, beispielsweise Maiskolben, dem Bearbeitungsteil des über Räder 4 auf dem Boden abgestützten Mähdreschers 2 zu führen.

Das Erntegerät 1 umfaßt im einzelnen einen Maschinenrahmen 5, eine Querförderschnecke 6, Abdeckungen 7, Teilerspitzen 8 und eine Anzahl von Pflückeinheiten 9, von denen Fig. 2 beispielsweise vier Pflückeinheiten 9 veranschaulicht.

Jede Pflückeinheit 9 umfaßt, wie insbesondere die Fig. 4 bis 6 erkennen lassen, zwei Pflückwalzen 10,11, die jeweils von einem Getriebe 12,13 her angetrieben sind. Oberhalb der Pflückwalzen 10,11 sind von Längsträgern 14,15 abgestützte Pflückplatten 16,17 vorgesehen, oberhalb der Einzugsketten 18,19 gegenläufig einwärts angetrieben umlaufen, die mit Mitnehmern 20 besetzt sind.

Unterhalb der Pflückwalzen 10,11 einer Pflückeinheit 9 kann ein Häckselwerk 21 vorgesehen sein, das die Halme des Ernteguts beim Durchzug durch die Pflückwalzen 10,11 häckselt. Bei dem dargestellten Häckselwerk handelt sich um ein solches mit rotierenden Messern 22, jedoch kann es auch jede geeignete andere Ausbildung erhalten.

Die Pflückwalzen 10,11 tragen an ihren Frontenden Einzugsschnecken 23,24 und haben einen konischen Grundkörper 25,26, der mit längslaufenden, Arbeitskanten 27,28 definierenden Stegen 29,30 besetzt ist. Die beidseits eines von den Pflückplatten 16,17 gebildeten Pflückspaltes 31 angeordneten Pflückwalzen 10,11 laufen im Betrieb in Richtung der Pfeile 32,33 (Fig. 6) um Drehachsen 34,35 um, die in Fahrrichtung F weisen und zu den Frontenden der Pflückwalzen 10,11 hin konvergierend ausgerichtet sind. Infolge dieser konvergierenden Ausrichtung der Drehachsen 34,35 kann den Pflückwalzen 10,11 eine Konizität vorgegeben werden, die ausschließlich unter Berücksichtigung des gewünschten Anstiegs der Umfangsgeschwindigkeit der konischen Arbeitsflächen, die von den Arbeitskanten 27,28 der Pflückwalzen 10,11 durchlaufen werden, zum Auslaufende des Durchgangsspaltes 36 hin gewählt werden kann, der zwischen den Pflückwalzen 10,11 ausgebildet ist.

Die Arbeitskanten 27 der einen Pflückwalze 10 sind bei dem dargestellten Ausführungsbeispiel (Fig. 6) zu den Arbeitskanten 28 der anderen Pflückwalze 11 jeweils auf Lücke versetzt, und die Arbeitskanten 27,28 definieren den Durchgangsspalt 36 jeweils bei Durchlaufen der Winkelstellung mit geringstem

Abstand zum Walzengrundkörper 25,26 der benachbarten Pflückwalze mit deren Mantelfläche. Die Breite des so definierten Durchgangsspaltes 36 zwischen den Pflückwalzen 10,11 kann an deren Frontenden etwa 6 bis 15 mm, vorzugsweise etwa 8 bis 12 mm, und an deren Basisenden etwa 2 bsi 10 mm, vorzugsweise etwa 3 bis 6 mm betragen.

Bei einer abgewandelten Ausführung können die Arbeitskanten 27,28 beider Pflückwalzen 10,11 bei Durchlaufen der Winkelstellung mit jeweils geringstem Abstand zur Arbeitsfläche der benachbarten Pflückwalze den Arbeitskanten der benachbarten Pflückwalze jeweils fluchtend gegenüberliegen und dabei zwischen sich den Durchgangsspalt 36 begrenzen. Bei dieser Ausgestaltung kann der Durchgangsspalt 36 zwischen den Pflückwalzen 10,11 eine im wesentlichen gleichbleibende Breite von etwa 1 bis 10 mm, vorzugsweise etwa 3 bis 5 mm, aufweisen.

Die Grundkörper 25,26 der Pflückwalzen 10,11 weisen eine konische Mantelfläche auf, und die die Arbeitskanten 27,28 darbietenden Stege 29,30 haben eine über ihre Länge gleichbleibende Höhe, so daß die von den Arbeitskanten 27,28 definierten Arbeitsflächen der Pflückwalzen 10,11 die Mantelflächen der Grundkörper 25,26 konisch im Abstand umgibt. Dabei beträgt der Arbeitsflächendurchmesser am Frontende der Pflückwalzen 10,11 etwa 75 bis 125 mm, vorzugsweise 90 bis 110 mm. Die Länge der Pflückwalzen beträgt im allgemeinen zwischen 400 bis 600 mm.

Patentansprüche:

1. Gerät zum Ernten von Mais od.dgl. Körnerfrüchten, insbesondere Vorsatzgerät für Mähdrescher (2) oder Feldhäcksler, mit zwei beidseits eines Pflückspaltes (31) zur Trennung des Fruchtstandes von dem diesen tragenden Pflanzenteil angeordneten Pflückwalzen (10,11), die um in Fahrtrichtung (F) des Geräts (1) weisende Drehachsen (34,35) angetrieben umlaufen und mit mehreren längslaufenden, über ihren Walzengrundkörper (25,26) vorstehende Arbeitskanten (27,28) ausbildenden Stegen (29,30), Rippen od.dgl. Vorsprüngen versehen sind, wobei die über den Umfang der Walzengrundkörper (25,26) verteilt angeordneten Arbeitskanten (27,28) der Pflückwalzen (10,11) sich zum Frontende der Pflückwalzen (10,11) hin konisch verjüngende Arbeitsflächen durchlaufen und miteinander oder mit dem Walzengrundkörper (25,26) der jeweils benachbarten Pflückwalze einen Durchgangsspalt (36) begrenzen, **dadurch gekennzeichnet,** daß die Drehachsen (34,35) der Pflückwalzen (10,11) zu den Frontenden der Pflückwalzen (10,11) hin konvergieren.

2. Gerät nach Anspruch 1, **dadurch gekennzeichnet,** daß die Grundkörper (25,26) der Pflückwalzen (10,11) eine konische Mantelfläche aufweisen, die von den konischen Arbeitsflächen im Abstand konzentrisch umgeben sind.

3. Gerät nach Anspruch 1 oder 2, **dadurch gekennzeichnet,** daß die Arbeitskanten (27) der einen Pflückwalze (10) zu den Arbeitskanten (28) der anderen Pflückwalze (11) jeweils auf Lücke versetzt sind, und die Arbeitskanten (27,28) jeweils bei Durchlaufen der Winkelstellung mit geringstem Abstand zum Wal-

zengrundkörper (25,26) der benachbarten Pflückwalze mit deren Mantelfläche den Durchgangsspalt (36) definieren.

4. Gerät nach einem der Ansprüche 1 bis 3, **dadurch gekennzeichnet,** daß die Arbeitskanten (27,28) beider Pflückwalzen (10,11) bei Durchlaufen der Winkelstellung mit geringstem Abstand zur Arbeitsfläche der benachbarten Pflückwalze den Arbeitskanten der benachbarten Pflückwalze jeweils fluchtend gegenüberliegen und zwischen sich den Durchgangsspalt (36) definieren.

5. Gerät nach einem der Ansprüche 1 bis 4, **dadurch gekennzeichnet,** daß die Konizität der Arbeitsflächen der Pflückwalzen (10,11) und der Konvergenzwinkel der Drehachsen (34,35) so aufeinander abgestimmt sind, daß die Rotationsgeschwindigkeit der Arbeitsflächen der Pflückwalzen (10,11) vom Front- zum Basisende hin um zumindest 25%, vorzugsweise etwa 50%, ansteigt.

6. Gerät nach Anspruch 3, **dadurch gekennzeichnet,** daß die Breite des Durchgangsspaltes (36) zwischen den Pflückwalzen (10,11) an deren Frontenden etwa 6 bis 15 mm, vorzugsweise etwa 8 bis 12 mm, und an deren Basisenden etwa 2 bis 10 mm, vorzugsweise etwa 3 bis 6 mm, beträgt.

7. Gerät nach Anspruch 4, **dadurch gekennzeichnet,** daß der Durchgangsspalt (36) zwischen den Pflückwalzen (10,11) eine im wesentlichen gleichbleibende Breite von etwa 1 bis 10 mm, vorzugsweise etwa 2 bis 5 mm, aufweist.

8. Gerät nach einem der Ansprüche 1 bis 7, **dadurch gekennzeichnet,** daß der Arbeitsflächendurchmesser am Frontende der Pflückwalzen (10,11) etwa 75 bis 125 mm, vorzugsweise etwa 90 bis 110 mm, beträgt.

9. Gerät nach einem der Ansprüche 1 bis 7, **dadurch gekennzeichnet,** daß den Pflückwalzen (10,11) eine Häckselvorrichtung (21) zugeordnet ist.

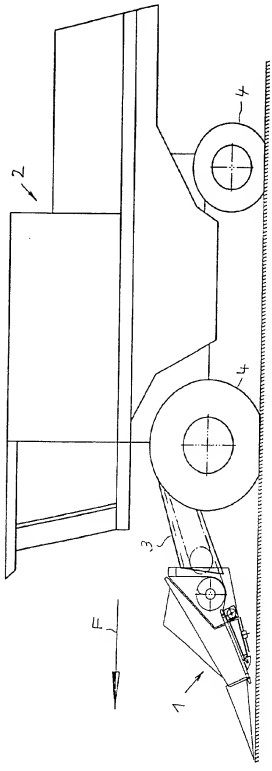

Fig. 1

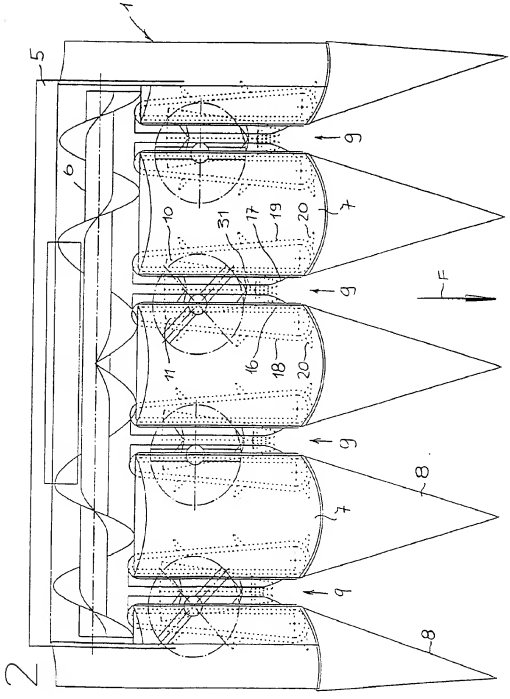

Fig. 2

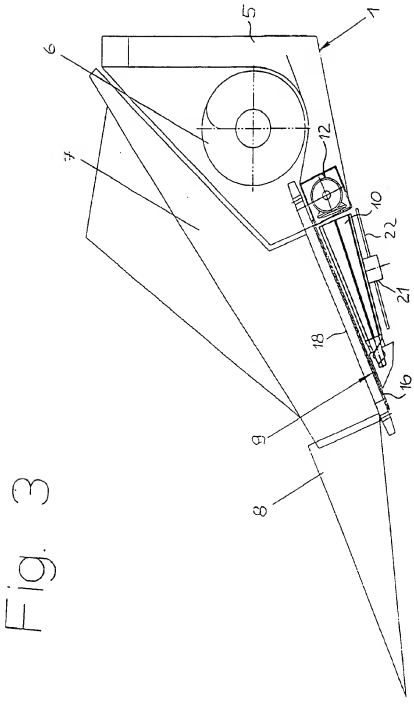

Fig. 3

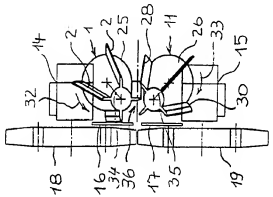

Fig. 6

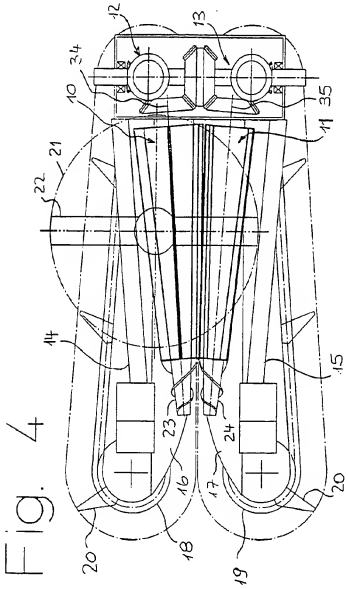

Fig. 4

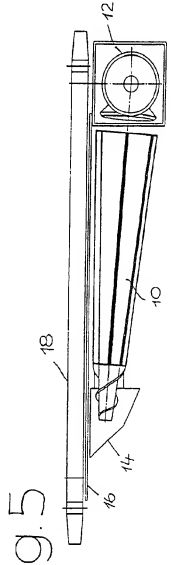

Fig. 5

INTERNATIONAL SEARCH REPORT

Int. Application No
PCT/EP 98/04371

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 A01D45/02

According to International Patent Classification(IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 A01D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2 870 593 A (ANDERSON) 27 January 1959 see column 4, line 1 - line 21; figures 3,6 ---	1-8
Y	DE 68 09 134 U (HAGEDORN) 20 March 1969 see the whole document ---	1-8
A	FR 2 522 925 A (GERINGHOFF CARL GMBH CO KG) 16 September 1983 see figure 2 ---	9
A	US 2 527 190 A (KUHLMAN) 24 October 1950 ---	
A	DE 32 31 953 A (POETTINGER ALOIS LANDMASCH) 1 March 1984 ---	
A	US 1 351 665 A (LOGARZO) 31 August 1920 ---	
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[X] Further documents are listed in the continuation of box C.

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Date of the actual completion of the international search	Date of mailing of the international search report
23 November 1998	30/11/1998

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	De Lameillieure, D

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 845 930 A (DOW PAUL W) 11 July 1989	

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2870593 A	27-01-1959	NONE	
DE 6809134 U		NONE	
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US 2527190 A	24-10-1950	NONE	
DE 3231953 A	01-03-1984	AT 391395 B	25-09-1990
US 1351665 A	31-08-1920	NONE	
US 4845930 A	11-07-1989	NONE	

INTERNATIONALER RECHERCHENBERICHT

Int. Aktenzeichen
PCT/EP 98/04371

A. KLASSIFIZIERUNG DES ANMELDUNGSGEGENSTANDES
IPK 6 A01D45/02

Nach der Internationalen Patentklassifikation (IPK) oder nach der nationalen Klassifikation und der IPK

B. RECHERCHIERTE GEBIETE

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Recherchierte aber nicht zum Mindestprüfstoff gehörende Veröffentlichungen, soweit diese unter die recherchierten Gebiete fallen

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C. ALS WESENTLICH ANGESEHENE UNTERLAGEN

Kategorie*	Bezeichnung der Veröffentlichung, soweit erforderlich unter Angabe der in Betracht kommenden Teile	Betr. Anspruch Nr.
Y	US 2 870 593 A (ANDERSON) 27. Januar 1959 siehe Spalte 4, Zeile 1 - Zeile 21; Abbildungen 3,6 ---	1-8
Y	DE 68 09 134 U (HAGEDORN) 20. März 1969 siehe das ganze Dokument ---	1-8
A	FR 2 522 925 A (GERINGHOFF CARL GMBH CO KG) 16. September 1983 siehe Abbildung 2 ---	9
A	US 2 527 190 A (KUHLMAN) 24. Oktober 1950 ---	
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A	US 1 351 665 A (LOGARZO) 31. August 1920 ---	

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[X] Weitere Veröffentlichungen sind der Fortsetzung von Feld C zu entnehmen

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23. November 1998	30/11/1998

Name und Postanschrift der Internationalen Recherchenbehörde	Bevollmächtigter Bediensteter
Europäisches Patentamt, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	De Lameillieure, D

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C.(Fortsetzung) ALS WESENTLICH ANGESEHENE UNTERLAGEN

Kategorie*	Bezeichnung der Veröffentlichung, soweit erforderlich unter Angabe der in Betracht kommenden Teile	Betr. Anspruch Nr.
A	US 4 845 930 A (DOW PAUL W) 11. Juli 1989	

2

INTERNATIONALER [redacted]CHERCHENBERICHT

Angaben zu Veröffentlichungen, die zur selben Patentfamilie gehoren

Int. [redacted]es Aktenzeichen
PCT/EP 98/04371

Im Recherchenbericht angeführtes Patentdokument		Datum der Veröffentlichung	Mitglied(er) der Patentfamilie		Datum der Veröffentlichung
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US 2527190	A	24-10-1950	KEINE		
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US 1351665	A	31-08-1920	KEINE		
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US006412259B1

(12) **United States Patent**
Wiegert

(10) **Patent No.: US 6,412,259 B1**
(45) **Date of Patent: Jul. 2, 2002**

(54) **GATHERING ROLLER MECHANISM FOR HARVESTING DEVICE AND HARVESTING DEVICE UTILIZING SAME**

(75) Inventor: **Ludger Wiegert**, Ostbevern (DE)

(73) Assignee: **Claas Saulgau GmbH**, Saulgau (DE)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

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§ 371 (c)(1),
(2), (4) Date: **Jan. 11, 2000**

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PCT Pub. Date: **Jan. 28, 1999**

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(52) **U.S. Cl.** **56/60**; 56/94; 56/1.4

(58) **Field of Search** 56/114, 500, 119, 56/94, 66, 59, 75, 78, 82, 88, 93, 38, 111, 118, 104–105, 106, 69, 108

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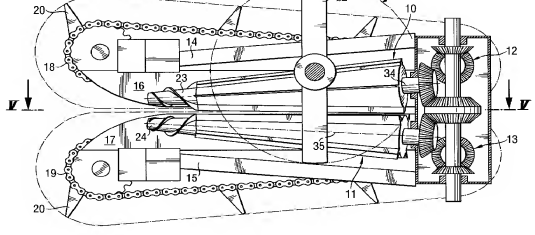
Primary Examiner—Robert E. Pezzuto
Assistant Examiner—Árpád Fábián Kovács
(74) *Attorney, Agent, or Firm*—Jordan and Hamburg LLP

(57) **ABSTRACT**

The device for harvesting corn or similar cereals, which can be constructed particularly as an attachment for combine harvesters or field choppers, having two gathering rollers, which are disposed on either side of a gathering gap for separating the fruit from the plant part bearing it, are driven to rotate about axes of rotation pointing in the direction of travel of the device and are provided with several longitudinally extending cross members, ribs or similar projections, forming working edges protruding over the basic bodies of their rollers. The working edges of the gathering rollers, disposed distributed over the perimeter of the basic bodies of the rollers, traverse working surfaces tapering conically towards the front end of the gathering rollers and with one another or with the basic body of the respectively adjacent gathering roller, form the boundary of the passage gap. The axes of rotation of the gathering rollers converge towards the front ends of the gathering rollers.

20 Claims, 5 Drawing Sheets



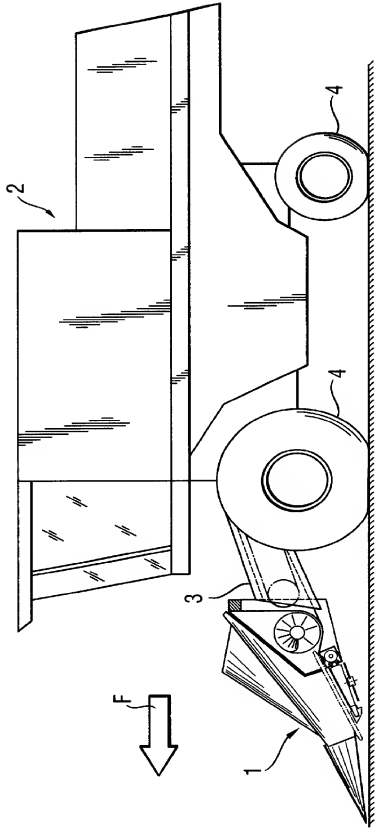


Fig. 1

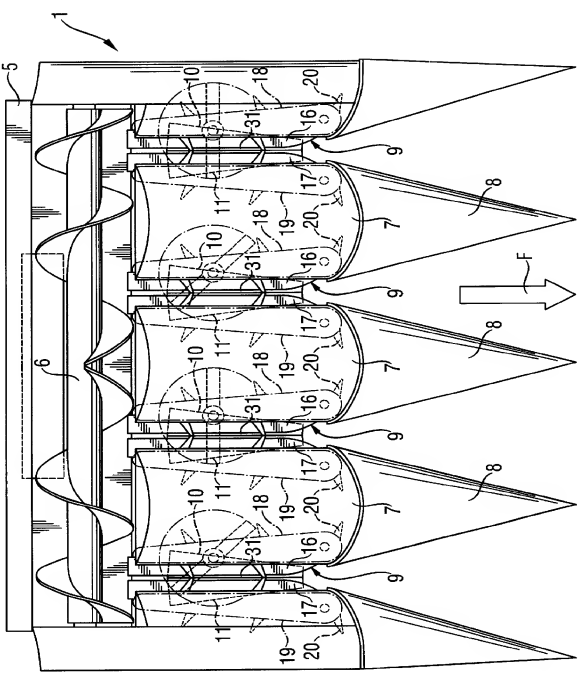


Fig. 2

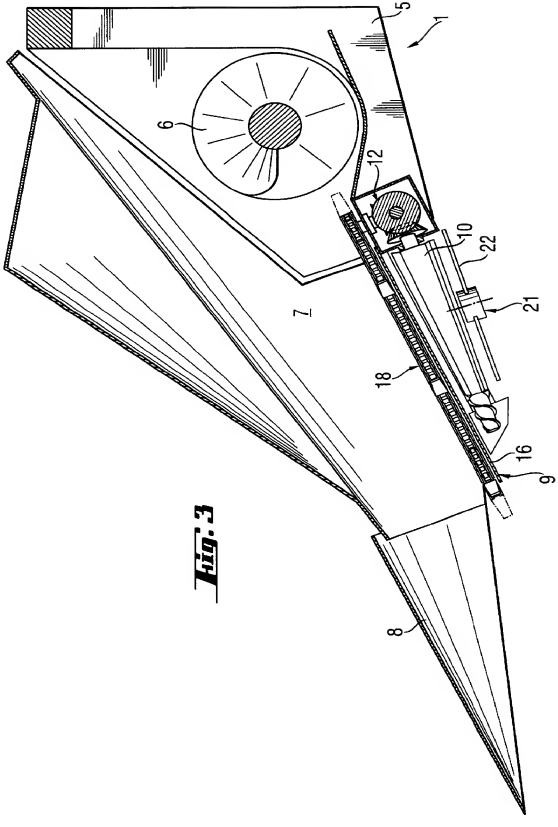


Fig. 3

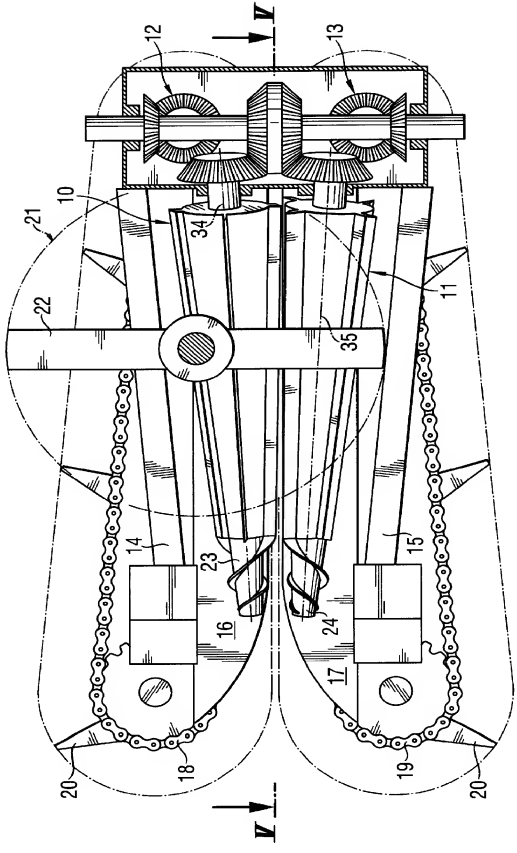


Fig. 4

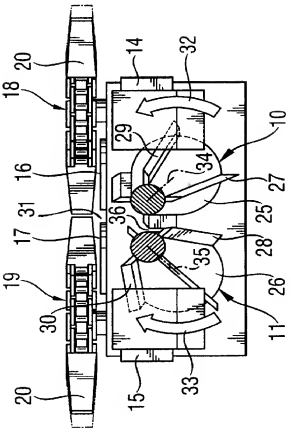

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Fig. 6

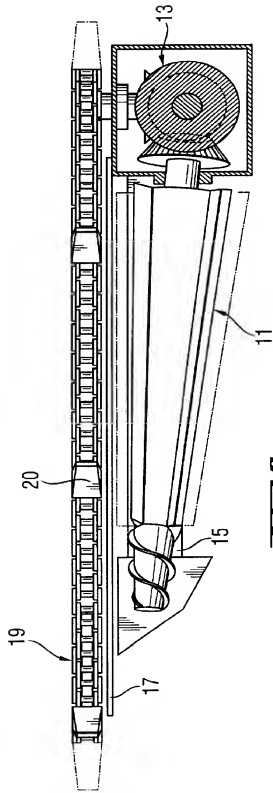
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Fig. 5

GATHERING ROLLER MECHANISM FOR HARVESTING DEVICE AND HARVESTING DEVICE UTILIZING SAME

BACKGROUND OF THE INVENTION

The invention relates to a device for harvesting corn or similar cereals, especially to an attachment for combine harvesters or field choppers.

In the case of a known device of this type (DE-B-17 57 213; U.S. Pat. No. 2,870,593), the axes of rotation of the gathering rollers are aligned parallel to one another. The conicity of the working surfaces of the gathering rollers accordingly creates a passage gap, which decreases in width towards the rear base end of the gathering roller.

For a different, known device (DE-A-20 00 140, FR-A-1 268 615), the gathering rollers have cylindrical working surfaces. The axes of rotation of the gathering rollers diverge towards the front end of the gathering rollers, so that a passage gap, which decreases in width towards its rear end, is likewise formed by these means.

In the case of a furthermore known device (DE-C-39 18 362), the gathering rollers have cylindrical working surfaces and axes of rotation, which are mutually aligned in parallel and accordingly a passage gap, the width of which remains the same over its length. For comminuting the harvested stalks, a cutting device with, for example, a rotating cutting knife may be provided below the gathering rollers.

SUMMARY OF THE INVENTION

The invention is concerned with the problem of creating a harvesting device of the type mentioned above, which, while reducing the wear at the gathering rollers, realizes a gathering process, which treats the harvested material with particular care in the front region of the passage gap.

Because the axes of rotation of the gathering rollers are aligned so as to converge towards the front ends of the gathering rollers, the conicity of the gathering rollers can be selected freely from the point of view of specifying a desired speed of pulling the harvested material through the passage gap .and of increasing this speed towards the discharging end. while the desired configuration of the passage gap is retained. Accordingly, a relatively small diameter with a correspondingly low circumferential speed during the rotation while. working can be specified for the gathering rollers at the front inlet end of the passage gap, so that the action on the stalks of the harvested goods at the start of the drawing-through procedure sets in gently and the occurrence of slippage with the consequence of wear at the front ends of the gathering rollers is decreased. In coordination with the convergence angle of the axes of rotation, a conical angle can be specified for the gathering rollers and result in a relatively large increase in the diameter of the working circle of the gathering rollers, which is associated with a large increase in the circumferential speed of the working surface of the gathering rollers towards the discharging end of the passage gap. This increase in speed, which preferably is about 50%, permits an increase in the harvesting speed with gentle gathering or a shorter construction of the gathering rollers with retention of the harvesting speed.

Further details and effects arise out of the following description and the drawing, in which an example of the object of the invention is shown diagrammatically in greater detail.

IN THE DRAWINGS

FIG. **1** shows a side view of a coubine harvester with an inventive harvesting device as an attachment,

FIG. **2** shows a plan view of the harvesting device of FIG. **1**,

FIG. **3** shows a side view of the harvesting device on an enlarged scale,

FIG. **4** shows a gathering unit of the harvesting device of FIG. **2**, seen from below,

FIG. **5** shows a side view of the unit of FIG. **4**, and

FIG. **6** shows a front view of the unit of FIG. **4**.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. **1** illustrates a device **1** for harvesting corn or similar cereals, which forms an attachment for a combine harvester **2**. However, it can also be combined with a field chopper or used as an independent structural unit, such as an add-on unit. In the case of the example shown, the harvesting device is disposed ahead of a conveyor **3**, which supplies the harvested goods, for example, the corn cobs, to the processing part of the combine harvester **2**, which is supported by wheels **4** on the ground.

In detail, the harvesting device **1** comprises a machine frame **5**, a transverse screw conveyor **6**, covers **7**, divider points **8** and a number of gathering units **9**, of which, for example, four **(9)** are illustrated in FIG. **2**.

As can be seen particularly in FIGS. **4** to **6**, each gathering unit **9** comprises two gathering rollers **10**, **11**, which in each case are driven by a transmission **12**, **13**. Gathering plates **16**, **17**, which are supported by longitudinal beams **(14**, **15)**, are provided above the gathering rollers **10**, **11** above the drawing in chains **18**, **19** rotate in opposite directions driven inwards, which are studded with catches **20**.

Below the gathering rollers **10**, **11** of a gathering unit **9**, a chopper **21** may be provided, which chops the stalks of the harvested goods as the latter pass through the gathering rollers **10**, **11**. The chopper shown has rotating blades **22**; however, it may also have any different construction.

At their front ends, the gathering rollers **10**, **11** are equipped with drawing in screws **23**, **24** and have a conical, basic body **25**, **26**, which is studded with longitudinally extending cross members **29**, **30** defining working edges **27**, **28**. The, gathering rollers **10**, **11**, disposed on either side of a gathering gap **31** formed by the gathering plates **16**, **17**, run in the operating state in the direction of the arrows **32**, **33** (FIG. **6**) about the axes of rotation **34**, **35**, which point in the driving direction F and are aligned so as to converge towards the front ends of the gathering rollers **10**, **11**. As a result of this converging alignment of the axes of rotation **34**, **35**, a conicity can be specified for the gathering rollers **10**, **11** which, taking into consideration only the desired increase in the circumferential speed of the conical working surfaces, which are traversed by the working edges **27**, **28** of the gathering rollers **10**, **11**, can be selected towards the outlet end of the passage gap **36**, which is formed between the gathering rollers **10**, **11**.

In the case of the example shown (FIG. **6**), the working edges **27** of the one gathering roller **10** are offset with respect to the working edges **28** of the other gathering roller **11** to form a gap and the working edges **27**, **28** define the passage gap **36** in each case by traversing the angular position with the least distance from the basic body **25**, **26** of the surface of the adjacent gathering roller. The width of the passage gap **36**, so defined, between the gathering rollers **10**, **11**, can amount to about 6 to 15 mm and preferably about 8 to 12 mm at the front ends of the latter and to about 2 to **10** mm and preferably about 3 to 6 mm at the base ends.

In a modified version, the working edges **27**, **28** of the two gathering rollers **10**, **11**, on passing through the angular position with in each case the least distance from the working surface of the adjacent gathering roller, can in each case lie aligned opposite the working edges of the of the adjacent gathering roller and, at the same time, form the boundary of the passage gap **36**. With this development, the passage gap **36** between the gathering rollers **10**, **11** can have an essentially constant width of about 1 to 10 mm and preferably of about 3 to. 5 mm.

The basic bodies **25**, **26** of the gathering rollers **10**, **11** have a conical shell, and the cross members **29**, **30** presenting the working edges **27**, **28** have a constant height over their length, so that the working surfaces of the gathering rollers **10**, **11**, defined by the working edges **27**, **28**, surround the shells of the basic bodies **25**, **26** conically at a distance. At the same time., the diameter of the working surface at the front end of the gathering rollers **10**, **11** is about 75 to 125 mm and preferably 90 to 100 mm. The length of the gathering rollers generally is between 400 and 600 mm.

What is claimed is:

1. A harvesting device for harvesting a crop by separating a usable crop from vegetative material and having a front end, a rear end and a generally longitudinal axis extending between said front and rear ends, said harvesting device comprising:

a frame structure;

a first gathering roller mounted on said frame structure for rotation about a first roller axis in a first direction of rotation, said first gathering roller having a first basic body and first projections extending from said first basic body, said first projections having first working edges;

a second gathering roller mounted on said frame structure for rotation about a second roller axis in a second direction of rotation which is opposite to said first direction of rotation, said second gathering roller having a second basic body and second projections extending from said second basic body, said second projections having second working edges, said first and second gathering rollers being disposed juxtaposed to and spaced apart from one another to define a passage gap therebetween, said first and second basic bodies of the respective first and second rollers being formed with respective first and second conical surfaces which taper as said front end of the harvesting device is approached, said first and second roller axes converging toward one another as said front end of the harvesting device is approached, whereby the crop entering the passage gap is exposed to a circumferential speed of each of said first and second gathering rollers which is relatively low at front ends of said first and second gathering rollers as compared to a relatively large circumferential speed at a discharging end of each of said first and second gathering rollers thereby reducing wear at the front ends of the first and second gathering rollers; and

gathering plates laterally disposed on said frame above said first and second gathering rollers, said gathering plates having portions defining a gathering gap therebetween, rotation of said first and second in opposed directions drawing said vegetative material downward through said passage and gathering gaps, said usable crop being detached from said vegetative material and deposited on said gathering plates when said vegetative material is drawn through said gathering gap.

2. A harvesting device according to claim **1** wherein said first and second projections are elongated projections having first and second elongated working edges respectively, said first elongated working edges converging toward said first roller axis as said front end of the harvesting device is approached, said second elongated working edges converging toward said second roller axis as said front end of the harvesting device is approached.

3. A harvesting device according to claim **1** wherein said first conical surface has a first central conical axis which coincides with said first roller axis said second conical surface has a second central conical axis which coincides with said second roller axis.

4. A harvesting device according to claim **1** wherein said first working edges traverse a first conical surface having a first central conical axis which coincides with said first roller axis, said second working edges traversing a second conical surface having a second central axis which coincides with said second roller axis.

5. A harvesting device according to claim **1** wherein said first projections are angular off set from said second projections such that said first and second projections pass alternately through said passage gap.

6. A harvesting device according to claim **5** wherein said first and second rollers each have front and rear ends with said front ends being smaller than said rear ends, the minimum distance between a first working edge of said first roller and said basic body of said second roller as said first working edge traverses said passage gap is about 6 to about 15 mm at said front ends of said rollers and about 2 to 10 mm at said rear ends of said rollers.

7. A harvesting device according to claim **5** wherein said first and second rollers each have front and rear ends with said front ends being smaller than said rear ends, the minimum distance between a first working edge of said first roller and said basic body of said second roller as said first working edge traverses said passage gap is about 8 to about 12 mm at said front ends of said rollers and about 3 to about 6 mm at said read ends of said rollers.

8. A harvesting device according to claim **5** wherein the width between a first working edge of said first roller and said basic body of said second roller as said first working edge traverses said passage gap is a substantially constant width of about 1 mm to about 10 mm.

9. A harvesting device according to claim **5** wherein the width between a first working edge of said first roller and said basic body of said second roller as said first working edge traverses said passage gap is a substantially constant width of about 2 mm to about 5 mm.

10. A harvesting device according to claim **1** wherein each of said first and second basic bodies have a front end having a diameter of about 75 to about 125 mm.

11. A harvesting device according claim **1** wherein each of said first and second basic bodies have a front end having a diameter of about 90 to about 100 mm.

12. A harvesting device according to claim **1** further comprising a chopping device for chopping said crop, said chopping device being mounted on said frame structure and underlying said first and second gathering rollers.

13. A harvesting device according to claim **1** where each of said first and second basic bodies have front and rear ends and the respective conical surfaces have front and rear ends, the conicity of said first and second conical surfaces and the angle of convergence of the rotational axes of said first and second gathering rollers being seleeted such that the circumferential speed of the rear ends of said first and second conical surfaces is about 25% to about 50% greater than the

circumferential speed of the front ends of said first and second conical surfaces.

14. A harvesting device according to claim **1** wherein each of said first and second gathering rollers have a front end, and a drawing in helical device on the front end of said first and second gathering rollers for drawing is said crop.

15. A harvesting device according to claim **1** further comprising a drawing-in device having crop-engaging parts, said drawing-in device being mounted on said frame and overlying said gathering rollers so as to move said engaging parts in a direction toward the rear end of said harvesting device, said gathering plates being disposed between said gathering rollers and said drawing-in device.

16. A harvesting device according to claim **15** wherein said drawing-in device comprises an endless chain, said crop-engaging parts extending laterally from said endless chain.

17. A gathering unit for use in a harvesting device for harvesting a crop by separating a usable crop from vegetative material bearing said usable crop, said gathering roller mechanism comprising:

a gathering conveyer operable to convey the usable crop for collection following a separation of the usable crop from the vegetative material;

gathering plates disposed below said gathering conveyer and laterally spaced apart to define a gathering gap therebetween;

a first gathering roller and a second gathering roller disposed below said gathering conveyer and said gathering plates, said first and second gathering rollers being disposed side by side and mutually spaced apart to define a passage gap therebetween, said first and second gathering rollers being rotatably drivable in opposite directions about respective first and second axes of rotation which are arranged codirectional with a direction of travel of said harvesting device, said first and second gathering rollers including first and second basic bodies, respectively, said first and second basic bodies being formed with respective first and second conical surfaces which taper as a forward end of each of said first and second gathering rollers is approached, each of said first and second gathering rollers including longitudinally extending projections which form working edges protruding beyond each of said first and second basic bodies and which are distributed over a perimeter of said first basic body and second basic body of each of said first and second gathering rollers, such that when rotated in the opposite directions during use, said first and second gathering rollers operate to draw the vegetative material downwardly through said passage gap and said gathering gap, said usable crop being separated from said vegetative material as said vegetative material is drawn though said gathering gap, said usable crop thereby being deposited on said gathering plates and conveyed for collection by said conveyer, said first and second axes of rotation being convergent towards the forward end of said first and second gathering rollers facing said direction of travel whereby the crop entering the passage gap is exposed to a circumferential speed of each of said first and second gathering rollers which is relatively low at the forward ends of said first and second gathering rollers as compared to a relatively large circumferential speed at a discharging end of each of said first and second gathering rollers thereby reducing wear at the front ends of the first and second gathering rollers.

18. A gathering unit according to claim **12**, wherein the gathering conveyer includes at least one endless chain having crop-engaging parts which extend laterally from said endless chain.

19. A gathering unit according to claim **12**, wherein the gathering conveyer includes a pair of endless chains having crop-engaging parts which extend laterally from said endless chain, said endless chains being driven in opposite directions.

20. A gathering unit according to claim **12** wherein each of said first and second basic bodies have front and rear ends and the respective conical surfaces have front and rear ends, a conicity of said first and second conical surfaces and an angle of convergence of the rotational axes of said first and second gathering rollers being selected such that the circumferential speed of the rear ends of said first and second conical surfaces is about 25% to about 50% greater than the circumferential speed of the front ends of said first and second conical surfaces.

* * * * *

Jan. 15, 1957 E. S. THOMPSON 2,777,267

STALK AND ROOT PULLER AND SHREDDER

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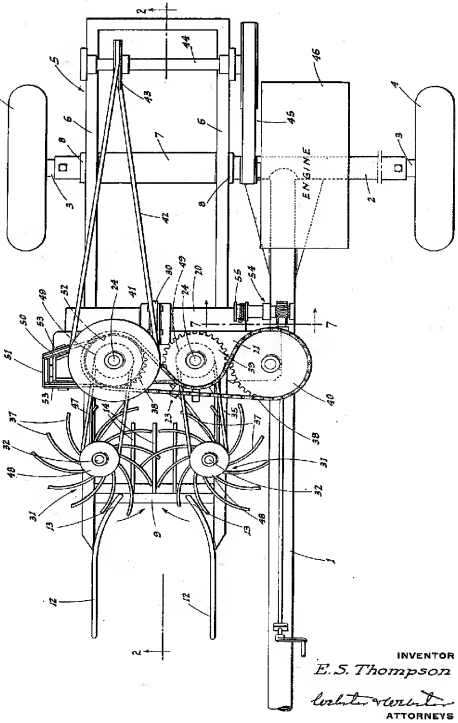

Fig. 1

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STALK AND ROOT PULLER AND SHREDDER

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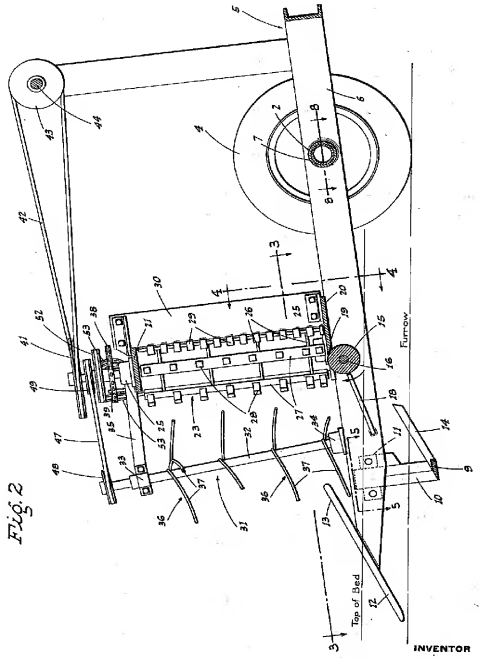

Fig. 2

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STALK AND ROOT PULLER AND SHREDDER

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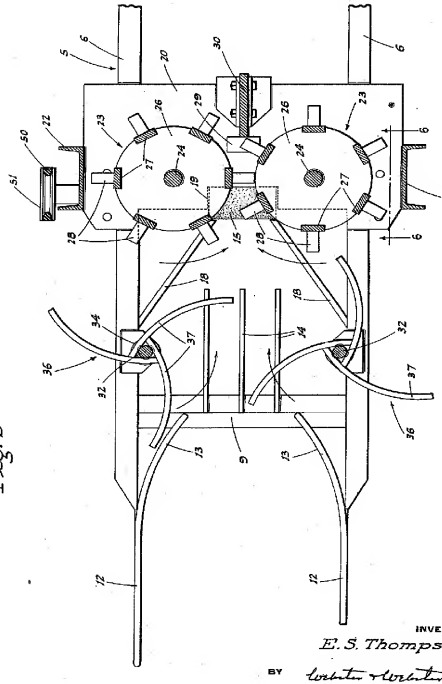

Fig. 3

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STALK AND ROOT PULLER AND SHREDDER

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Fig. 4

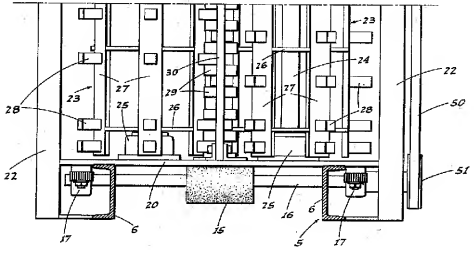


Fig. 5

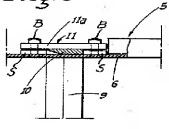


Fig. 6

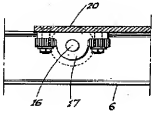


Fig. 7

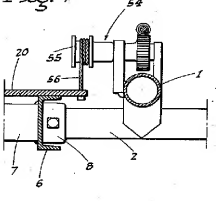
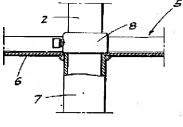


Fig. 8



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STALK AND ROOT PULLER AND SHREDDER

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Fig. 9

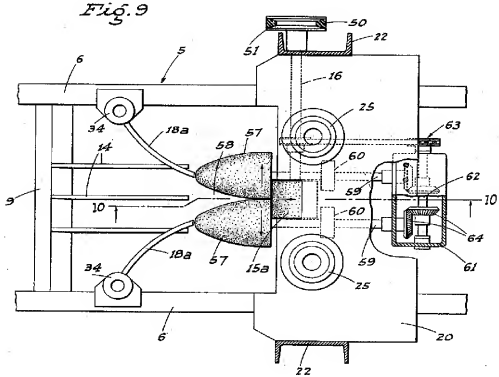
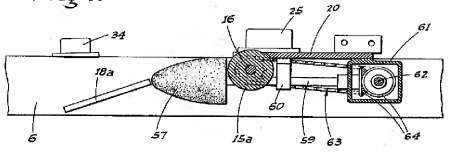


Fig. 10



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United States Patent Office

2,777,267

Patented Jan. 15, 1957

2,777,267

STALK AND ROOT PULLER AND SHREDDER

Ernest S. Thompson, Strathmore, Calif., assignor to said Thompson and Ethel Thompson, as joint tenants

Application December 7, 1953, Serial No. 396,682

4 Claims. (Cl. 55—64)

This invention relates to field implements; my major object being to provide an implement adapted to be drawn along and over a row of plants from which the crop has been harvested (such as cotton), and which will uproot the plants and feed them to a shredding mechanism on the implement, which mechanism will then throw the shreds onto the ground in scattered relation and in a finely divided condition for quick decomposition, as is desirable.

The implement includes upstanding plant-shredding cylinders and upstanding top-feeding units to direct the plants to the cylinders; and a further important object of the invention is to provide a plant-stalk pulling device, in the form of a compact multi-roller assembly, which will effectively grip the plant stalks and pull them up as the implement advances.

Another object of the invention is to provide an implement which is practical, reliable, and durable, and one which is exceedingly effective for the purpose for which it is designed.

These objects are accomplished by means of such structure and relative arrangement of parts as will fully appear by a perusal of the following specification and claims.

In the drawings:

Fig. 1 is a top plan view of the implement as built for single-row operation.

Fig. 2 is a sectional elevation of the same, taken on line 2—2 of Fig. 1, with the digging unit lowered to an operating position.

Fig. 3 is a fragmentary sectional plan, enlarged, on line 3—3 of Fig. 2.

Fig. 4 is a fragmentary transverse sectional elevation on line 4—4 of Fig. 2.

Fig. 5 is a fragmentary sectional plan on line 5—5 of Fig. 2.

Fig. 6 is a fragmentary sectional elevation on line 6—6 of Fig. 3.

Fig. 7 is a fragmentary transverse section on line 7—7 of Fig. 1.

Fig. 8 is a fragmentary sectional plan on line 8—8 of Fig. 2.

Fig. 9 is a fragmentary enlarged sectional plan, showing a modified stalk-pulling assembly; the vertical feeder-spiders and shredder cylinders of the implement being removed.

Fig. 10 is a fragmentary longitudinal section on line 10—10 of Fig. 9.

Referring now more particularly to the characters of reference on the drawings, and particularly at present to Figs. 1 to 8, the implement comprises an elongated tongue 1 adapted, at its forward end, for supported draft connection with a tractor, and secured at its rear end on a heavy cross shaft 2 of tubular form. The shaft, at its ends, adjustably supports the extension axles 3 of wheels 4 so that the width may be altered to suit different field conditions.

The frame 5 which carries the root-pulling and plant-shredding mechanism of the implement is disposed to one

side of the tongue and includes spaced side beams 6 which, toward the rear end of the frame, support a cross sleeve 7 through which shaft 2 turnably and slidably projects. The position of the sleeve (and frame) on the cross shaft, and relative to the tongue, is determined by adjustable collars 8 on the shaft at the ends of the sleeve (see Figs. 7 and 8). This enables the frame 5 to be properly centered over the raised row or bed to be worked on while the wheels track in furrows to the sides of such row.

Disposed between the beams 6 near the front and some distance below said beams is a transverse blade 9 having side standards 10 adjustably clamped in holding brackets 11 on the beams 6 so that the distance of the blade below the beams may be adjusted or the blade readily removed for servicing when necessary. Each bracket includes locating strips S somewhat thinner than standard 10 and secured on the corresponding beam 6 and between which the standard fits, and a cross strap 11a overlapping said standard and the strips S, and secured to the latter by clamping bolts B as shown in Fig. 5. Elongated lifter fingers 12 project lengthwise of and forwardly from the beams 6 at a downward slope, and terminate at their rear end above the beams and over the blade, and curve laterally inward, as at 13.

Projecting rearwardly and upwardly from the blade 9 are parallel longitudinally extending lifter fingers 14 arranged to direct the stalks, etc. cut by the blade 9 toward a rough surfaced roller 15 fixed centrally between the beams 6 on a shaft 16 journaled in spring or rubber-mounted bearings 17 on beams 6, as shown in Figs. 4 and 6, so that the roller may yield downwardly if required. Laterally converging crowder bars 18 extend laterally in converging relation from the beams 6 rearwardly of blade 9 to the ends of the roller, as shown in Fig. 3.

The roller 15 projects through the front opening 19 in a plate 20 extending over and fixed on beams 6 with the edges of said opening relatively close to the roller. A cross plate 21, some distance above and parallel to plate 20, is supported from said plate and the beams 6 by side uprights 22.

Disposed between the plates are transversely spaced vertical-axis shredder cylinders, indicated generally at 23, and disposed symmetrical to the roller 15. Each cylinder comprises a central shaft 24 journaled in bearings 25 secured on the plates, spaced discs 26 fixed on the shaft, bars 27 parallel to the shaft supported by the discs, and sharp cornered teeth 28 of square section radiating from the bars. The bars of the two cylinders are disposed in circumferentially and mainly vertically staggered or offset relation, as shown in Figs. 3 and 4, and pass closely between rectangular sharp-cornered teeth 29 secured on and projecting from the forward edge of a rigid bar 30 extending between the plates and secured thereto.

This bar is disposed behind the cylinders in symmetrical relation thereto, and forms the equivalent of a concave. The bar 30 and teeth 28 are arranged so that the outer end corners of the teeth 28 pass closely the adjacent vertical corner of the bar, as is clearly evident from Fig. 3.

Upstanding from the beams 6, ahead of the cylinders and centered laterally out from the center of the cylinders and to the rear of blade 9 a short distance, are feeder units indicated generally at 31. Each unit comprises a shaft 32 journaled in top and bottom bearings 33 and 34; bearing 34 being secured on beams 6 while bearing 33 is mounted on an arm 35 projecting forwardly from plate 21. Projecting from the shaft at intervals in the height thereof are feeder spiders 36 each comprising feeder fingers 37 preferably of curved configuration horizontally as shown in Figs. 1 and 3; the fingers of each spider being circumferentially offset or staggered relative to the fingers of the other spiders, as shown in Fig. 1. Also, the fingers

of the top spider are preferably somewhat longer than the others so as to improve the lifting action on stalks which may have been leaned forwardly by the tractor ahead or by the weather. Said upper spider is located at a level slightly below the top of cylinders **23**.

The cylinders **23** are driven at a relatively high speed and so that their adjacent sides turn toward each other and to the rear by the following means:

A chain **38** is trained over sprockets **39** on shafts **24** and over an idler sprocket **40** supported on plate **21** in such a manner that the direction of rotation of the shafts relative to each other is reversed. A pulley **41** is fixed on one shaft **24** and a belt **42** extends from said pulley to another pulley **43** fixed on a transverse countershaft **44** supported from frame **5**. Shaft **44** is driven by a belt drive **45** from an engine, indicated at **46**, and mounted on the cross shaft **2**, and the adjacent portion of the tongue. Belt drive **45** is arranged so that its efficiency is not materially affected by rotative adjustment of frame **5** on the shaft **2**.

Shafts **32** are also driven in opposite directions by individual belts **47** trained about pulley **48** on shaft **32** and pulleys **49** on shafts **24**.

Roller **15** is driven so that its forward side turns rearwardly toward the top by means of a belt **50** which passes about a pulley **51** on one end of shaft **16** and a drive pulley **52** on one shaft **24**, and over direction changing pulleys **53** mounted on top of plate **21**.

Frame **5** may be adjusted up or down relative to the stationary tongue **1** about shaft **2**, so as to alter the digging depth of the blade **9**, by any suitable means. In the present instance, such means is shown as being a hand-actuated winch **54** mounted on the tongue and including a cable drum **55** overhanging the adjacent end of plate **20** and from which drum cable **56** depends to an anchor on said plate.

In operation, with the frame adjusted so that blade **9** operates at the desired depth in the raised bed or row being worked on, the picker fingers **12**, at their forward end, skim along just under the surface of the ground, picking up any downed stalks and lifting them up to the feeder units **37** and at the same time preventing such stalks from possibly clogging the blade **9**. As the implement advances, said blade cuts through the tap roots of the plants just at the time the fingers **37** of the feeder units engage the tops of the plants and feeds them to the shredder cylinders **23**. These fingers acting in cooperation with the roller **15**, the lifter fingers **14**, and the crowder bars **18**, pull the cut and loosened plants and cause the same to be forced between the high-speed cylinders **23**. The teeth **28** of the cylinders grab the plants fed thereto and without too much initial breakage of the plants, force the plants against the stationary teeth **29** of the concave. Due to the close engagement of the cylinder teeth with the teeth and mounting bar **30** of the concave, practically nothing gets past the concave without being well cut, split, and broken up, or well shredded. Due to the momentum given to the shredded pieces by the shredding cylinders, such pieces are then scattered over the ground in condition for quick decomposition.

Since the heaviest portions of the plants naturally pass near the lower plate **20** and the adjacent portions of the cylinder units and concave, the lower rows of teeth thereof are closer together than further up, as shown.

The crowder bars **18** tend to crowd all stalks onto roller **15**. Since this roller runs close to the lower portions of the shredder cylinders and concave, it helps pinch the stalks for shredding, and being yieldably mounted, allows the larger stalks to pass between the rollers and cylinders with nearly the same pressure as is exerted on the smaller stalks.

In the modification shown in Figs. 9 and 10, the general assembly and arrangement of parts is the same as above described.

In this modification, however, the pull-up roller **15***a* is somewhat shorter than roller **15**, and projecting ahead of said roller **15***a* in symmetrical and cooperating relation therewith is a pair of forwardly projecting rollers **57**, disposed in close transversely spaced relation. These rollers are of rough-surfaced yieldable rubber, and are shaped with a convergence to their forward end, or are of torpedo-nose or generally conical form, so as to leave a wedge-shaped space **58** therebetween, as shown in Fig. 9. The crowder bars **18***a*, which are secured to the side frame beams **6** of the implement, terminate at the tips of the rollers **57**, so as to deflect all the stalks into said wedge-shaped space **58**.

Rollers **57** at their rear end are close to roller **15***a*, and at the top are intermediate the center and the top of said roller **15***a*, as shown in Fig. 10.

The rollers **57** are mounted and driven in coordinated relation with roller **15***a*, so that the rollers **57** turn away from each other at the top, as indicated, by suitable means. As here shown, such means comprises horizontal shafts **59** projecting rearwardly from rollers **57** alongside roller **15***a* and under the driven shaft **16** thereof. Shafts **59** are journaled in bearing members **60** depending from the platform **20** which supports the shredding mechanism, and in a transverse gear box **61** secured to and disposed under said platform.

Journaled in the gear box is a transverse shaft **62** driven in the same direction as roller shaft **16** by a chain drive unit **63**. Bevel gear units **64** in the gear box between shaft **62** and shafts **59** drive the latter in the desired opposed direction; the gearing and chain drive being arranged so that the roller **15***a* and rollers **57** will turn at the same speed.

By reason of the specific roller arrangement defined, a very efficient stalk-pulling action is obtained, particularly in down cotton or other crops, since the stalks will be gripped in the three-way or triangular trap formed between the three coordinated rollers, and the plants will be positively pulled up. These rollers, therefore, together with the plant-top feeding spiders and shredding cylinders, form a combination by which plants will be both pulled and shredded in a very efficient manner.

From the foregoing description it will be readily seen that there has been produced such a device as substantially fulfills the objects of the invention, as set forth herein.

While this specification sets forth in detail the present and preferred construction of the device, still in practice such deviations from such detail may be resorted to as do not form a departure from the spirit of the invention, as defined by the appended claims.

Having thus described the invention, the following is claimed as new and useful, and upon which Letters Patent are desired:

1. A plant pulling and shredding implement comprising a frame adapted to be pulled along a field over a row of plants to be pulled, a blade below and supported by the frame to cut through the roots of the plants, a pair of cooperating shredding cylinders upstanding from the frame rearwardly of the blade in position to receive cut plants therebetween and arranged to be driven so that their adjacent sides turn rearwardly, the cylinders including rows of radial teeth to engage and feed the plants rearwardly, a relatively stationary concave upstanding from the frame rearwardly of the cylinders in a transverse plane centrally therebetween and including forwardly projecting teeth to cooperate in plant shredding relation with the cylinder teeth; a transverse plate on the frame directly below the cylinders, a rough surfaced roller disposed in a transverse plane between the cylinders and recessed into the front of the plate with its top adjacent the level of the plate, means to guide the plants as cut by the blade toward the roller for engagement thereby, and means to drive the roller so that its forward side moves upwardly.

2. A structure as in claim 1, in which the frame in-

cludes transversely spaced side beams and the plant guide means includes crowder bars secured against the beams above and rearwardly of the blade and extending thence in rearwardly converging relation to a termination adjacent the forward side of the roller at the ends thereof.

3. A structure as in claim 1, including a shaft for the roller, and downwardly yieldable bearings in which the shaft is journaled.

4. A plant pulling and shredding implement comprising a frame adapted to be pulled along a field over a row of plants to be pulled, a blade below and supported by the frame to cut through the roots of the plants, a plant shredding mechanism mounted on the frame rearwardly of and above the blade, and means mounted on the implement in position between the blade and the shredding mechanism to pull stalks of the cut plants and direct the same toward said mechanism; said means comprising a transverse friction roller, a pair of longitudinally disposed yieldable rollers extending forwardly from the transverse roller in close relation thereto and to each other, said pair of rollers being of generally conical form with their apices facing forwardly, and means to drive all said rollers in unison and so that the upper face of the transverse roller turns rearwardly and the pair of rollers turn away from each other at the top; the top level of the transverse roller being adjacent but above that of the yieldable rollers at their rear end.

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(21) Application No 7900683
(22) Date of filing
9 Jan 1979
(23) Claims filed
9 Jan 1979
(30) Priority data
(31) 218/78
(32) 12 Jan 1978
(33) Austria (AT)
(43) Application published
25 Jul 1979
(51) INT CL² A01D 57/22
45/02
(52) Domestic classification
A1F 6C 6J3B H53
(56) Documents cited
None

(54) An apparatus for picking up, cutting off and optionally conveying of stalked crops, in particular maize, grown in rows

(57) An apparatus for picking up, cutting off and conveying stalked crops, in particular maize, grown in a plurality of rows, to the infeed means of a harvesting machine such as a maize chopper, comprises two driven conveying drums 1, 2 provided on their peripheries with projections 10, guides 3, 4 and cutters 29, 29', associated respectare disclosed of the above construction for harvesting more than two rows of crops.

ERRATUM

SPECIFICATION NO 2012154A

Front page, heading (72) Inventor *delete* Wolfang Leposa *insert* Wolfgang Schremmer

THE PATENT OFFICE
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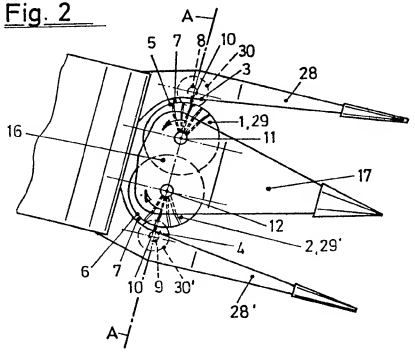
Fig. 2



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(51) **INT CL² A01D 57/22 45/02**
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A1F 6C 6J3B H53
(56) Documents cited
None
(58) Field of search
A1F
(71) Applicants
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Wolfang Leposa
(74) Agents
Jensen & Son

(54) **An apparatus for picking up, cutting off and optionally conveying of stalked crops, in particular maize, grown in rows**

(57) An apparatus for picking up, cutting off and conveying stalked crops, in particular maize, grown in a plurality of rows, to the infeed means of a harvesting machine such as a maize chopper, comprises two driven conveying drums 1, 2 provided on their peripheries with projections 10, guides 3, 4 and cutters 29, 29′, associated respectively with drums 1, 2, the guides being provided with respective cutters 30, 30′, and wherein the conveyor drums 1, 2 are axially staggered in relation to one another and partly overlap one another and wherein each guide 3, 4 extends over an arc subtending an angle between 60 and 90°. Arrangements are disclosed of the above construction for harvesting more than two rows of crops.

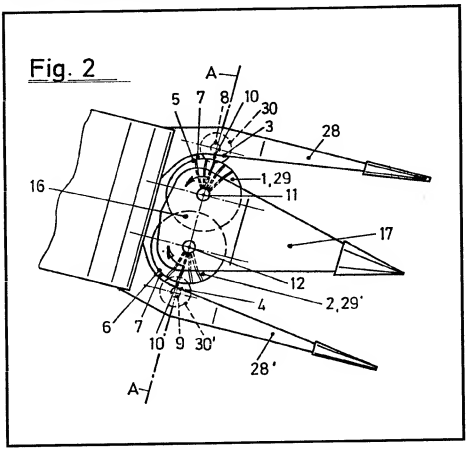

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Fig. 1

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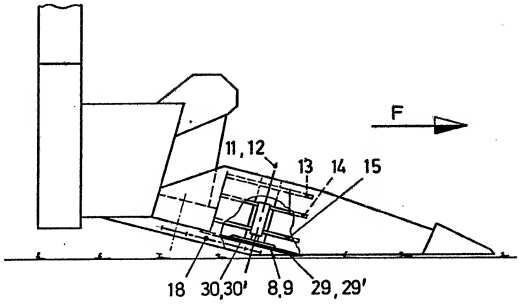

Fig. 2

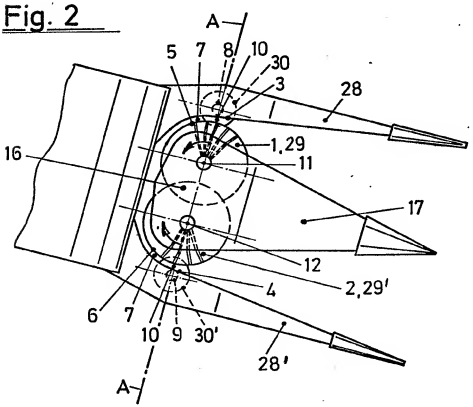

Fig. 3

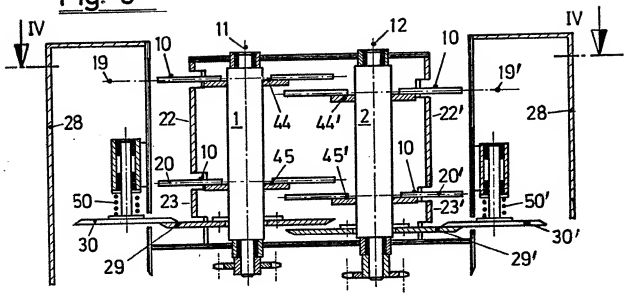
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Fig. 4

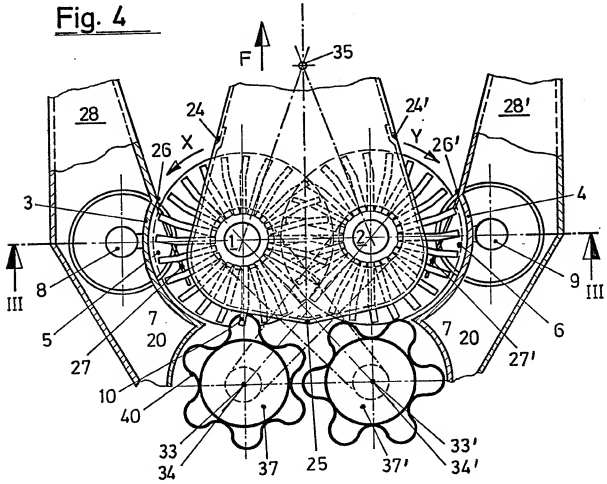
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Fig. 5

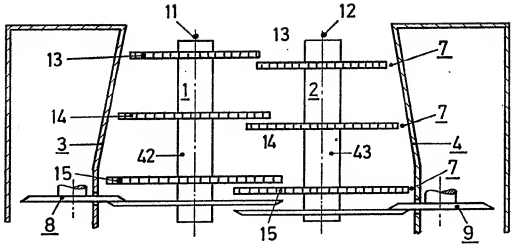
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Fig. 6

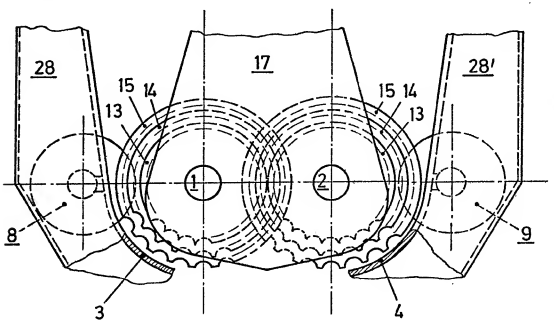
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Fig. 7

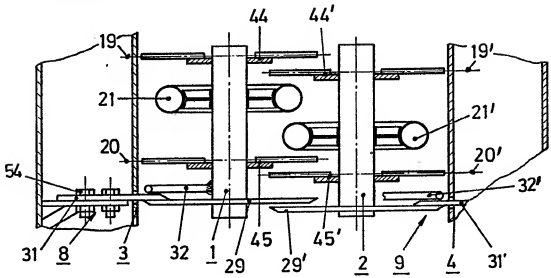


Fig. 8

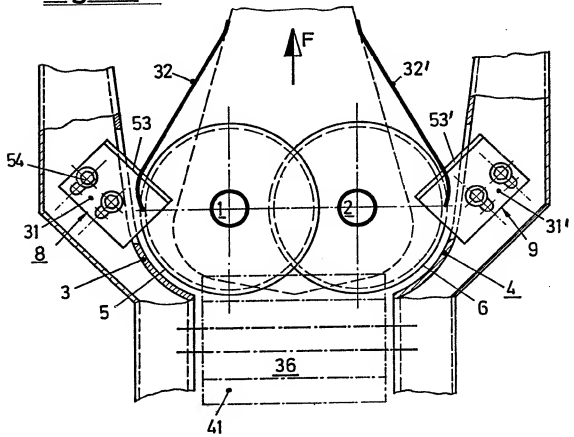


Fig. 9

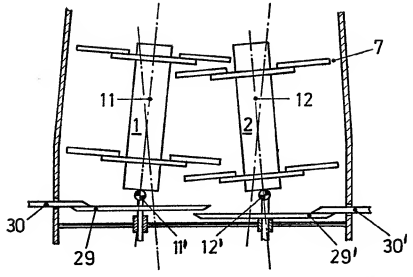
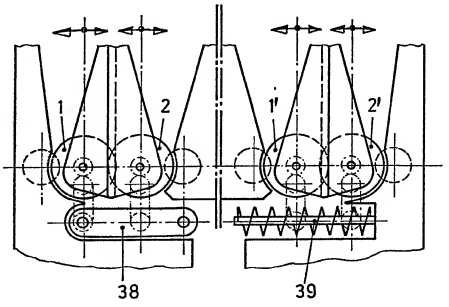


Fig. 10

Fig. 11



SPECIFICATION

An apparatus for picking up, cutting off and optionally conveying of stalked crops, in particular maize, grown in rows

The invention relates to an apparatus for picking up, cutting off and conveying of stalked crops, in particular maize, grown in a plurality of rows, to the infeed means of a harvesting machine such as a maize chopper, comprising two driven pick-up wheels of upright axes of rotation arranged side by side in driving direction and provided on their peripheries with projections, with one guide means and one cutting means associated to each pick-up wheel, said guide means being guided along a part of the periphery of the pick-up wheel at a distance which is small as compared to the diameter of the pick-up wheel and each guide means being provided with an associated cutting means in the range between guide means and pick-up wheel swept by the projections.

An apparatus for harvesting maize attachable to the cutter of a harvester combine or any other type of harvesting machine for grain is known. This apparatus grips the maize plants of one of a number of rows by means of tines arranged on the periphery of a wheel disk while they are cut off by the cutter of the harvesting machine and guides them along a guide means, with the conveying means changing from the longitudinal to the transverse direction in which the plants are conveyed to a conveyor screw positioned transversely to the driving direction of the harvesting machine. This apparatus is suitable for taking up the plants of one row only, so that the capacity of a large harvesting machine is not adequately utilised. This apparatus is driven in an elaborate and fail-prone manner by means of a belt drive across the front face of the harvesting machine and tapped from its drive. (German Auslegeschrift No. 1 226 351).

A similar apparatus, for harvesting turnip greens, is object of German Offenlegungsschrift No. 2 553 030. This apparatus consists of a drum provided on its periphery with projections and driven clockwise around an essentially upright axis, said drum preferably consisting of two chain wheels between which an elastic holding ring is attached and cooperating with a guide surface surrounding it at close distance around approximately half of its circumference, with the guide surface and circumference of the drum extending up to the inlet opening of a chopper blower.

German Utility Model No. 1 998 716 describes a pick-up apparatus having two intake belts gripping the cut-off plants and guiding them to the pre-press rolls. On the front ends, pick-up drums rotating in opposite directions around upright axes of rotation and provided on their surfaces with fingers are arranged, while on the bottom side of the drum, equal-sized and overlapping follower cutting disks rotate. This arrangement is of great length, which is a disadvantage. Two- or multiple-row pick up apparatus of this type would be very complex. The use of belts or chains is impractical because of the hazard of breakage and the accompanying, usually major damage to the harvesting machine.

Moreover, the driving speed and running speed of the belts or chains have to be adapted to one another if breakdowns, particularly those due to jamming, are to be avoided.

Further known is a number of two- or multiple-row pick-up apparatus, but these for the most part include cooperating loop belts or chains. A multiple-row pick-up apparatus for stalked crops grown in rows is described in German Offenlegungsschrift No 2 210 635 and provides for the use of infeed belts which clamp the plants fast and convey them along a guide wall. An infeed wall is associated to each row of plants and rotating cutting disks cooperating either with stationary counter-knives or with equal-sized, frictionally overlapping and thus following cutting disks are arranged on the ends of the infeed wall in driving direction. The plants are transferred from the rear ends of the belts to the pre-pressing rolls of the harvesting machine. Holding of the plants in the infeed belt causes trouble if the stalks of the plants are of varying thickness. Transferring of the plants to the pre-pressing rolls is also done inaccurately, so that improper gripping of the plants will cause breakdowns or loss of plants in this case, as well.

In order to avoid the drawbacks of chain and belt infeeds, particularly because of the hazard of breakage of the chains or belts, attempts have been made to employ known, upright infeed rolls for two-row harvesting machines, such as they are described in Austrian Patent Specification No. 320 331. These implements are very elaborate, mainly due to the double provision of the pick-up apparatus and the optionally also doubly provided chopping means. Moreover, the considerably increasing expenditure makes it impractical to harvest more than two rows of crops simultaneously with this type of apparatus.

It is the object of the invention to avoid these disadvantages and to provide a pick-up apparatus which, at short and simple construction and under exclusive use of continuous pick-up organs, will harvest two or more rows of stalked plants, gather them to a stream and transfer them to the infeed means or conveying means of a harvesting machine, in particular a maize chopper. At the same time, mainly rotable construction elements are to be used and loops, belts or the like, which are essentially more fail-prone, are to be avoided.

This is achieved in an apparatus of the type initially mentioned by staggering the adjacent pick-up means in relation to one another in axial direction and by intermeshing them partly overlapping one another and by guiding the guide means of each pick-up means over an angle range of particularly at least 60 to 90°.

An advantageous arrangement of the pick-up wheels staggered in relation to one another in axial direction is achieved by providing for the axes of rotation of the pick-up wheel to be inclined in driving direction, which facilitates the picking up and lifting up of the crop.

It may be of advantage to provide the pick-up wheels along their axes with wheel disks of varying diameters, with the wheel disks of larger diameter positioned underneath when the plant stalks are introduced into the infeed means arranged behind at a wider angle in relation to the ground and the wheel disks positioned on top when the plant stalks are introduced at a steeper angle in relation to the ground.

It is of advantage when each pick-up wheel, in particular each pair of intermeshing pick-up wheels, is covered over a part of its surface by a dumping table preferably merging in driving direction in a projectingly tapering stalk or row divider covering the front face of the pick-up wheels. This provides a supporting surface for the plants and effects the division of the standing plant stalks in front of the pick-up wheels.

The drive is simplified by individually driving the pick-up wheels axially staggered in relation to one another by means of a low-positioned drive, preferably via identically rotating infeed organs of a rearwardly positioned infeed means of a harvesting machine.

For careful gripping of the plant stalks, it is practical to provide the pick-up wheels staggered in relation to one another in driving direction along their outer peripheries with radial tines or the like which are bent or angled counter to the rotating direction, with the associated projections, tines or the like of different wheel planes of each pick-up wheel preferably being arranged in axial direction one above the other.

As the thickness of the plant stalks to be harvested may strongly vary and all the plant stalks are to be held fast, it is favourable to provide, between adjacent wheel planes of the pick-up wheels staggered in relation to one another in driving direction, at least one each, optionally following, elastic, resilient clamping body, in particular hollow body, which essentially surrounds the axis of rotation and preferably extends into the range of the projections, tines or the like.

In order to avoid entraining of plants or plant parts by the pick-up wheel and a resulting entangling of the plants, stripping means are associated to the pick-up wheels, the stripping means extending into the central plane between pairs of intermeshing pick-up wheels and starting out from points positioned in driving direction in front of the axis of rotation and optionally within the circle of circumference of the roots of the tines or the like up to a point positioned behind the axis of rotation and within the circle of circumference of the tips of the tines or the like and between the adjacent wheel planes of each pick-up wheel.

For gathering the plants or adjacent rows, it is particularly advantageous to provide for the guide means of each pick-up wheel to be guided behind the plane of the axis of rotation of the pick-up wheel positioned essentially vertically in relation to the driving direction over a quarter at the most of the wheel circumference of the pick-up wheel and optionally extend in the direction of the infeed means of a harvesting machine.

In order to keep the harvested plants upright while conveying them to the conveying means positioned behind, the guide means of each pick-up wheel is arranged essentially vertically.

It has proven advantageous to form the guide means of each pick-up wheel as a closed surface, as this largely prevents jamming.

In order to combine a favourable diameter of the pick-up wheel with an advantageous adaptation to the prevailing distances between the rows, it is practical to guide the guide means from a point on the circumference of the pick-up wheel in front of the axial plane of the pick-up wheel positioned essentially vertically to the driving direction along the circumference of the pick-up wheel.

An improved introduction of the plant stalks between the projections, tines or the like of the pick-up wheels is achieved by providing the guide means with at least one elastic guide element in the circumferential range of the associated pick-up wheel, said elastic guide element at least partly crossing the circumferential range and at least partly extending counter to the driving direction.

To assure a simple construction, the guide means can have the form of a row- or stalk divider taperingly extending in driving direction.

A favourable cutting angle is achieved by providing for the cutting means associated to each pick-up wheel to consist of rotating knife- or cutting disks, with the knife disks which are preferably of larger diameter than the remaining cutting disks being arranged on the axis of rotation of the associated pick-up wheel.

It is of advantage to associate cutting disks of larger diameter within the range of the guide means to cutting disks of smaller diameter, said cutting disks of smaller diameter being rotatably positioned around an axis sta-

tionarily fixed to the apparatus body and overlapping, preferably engagingly, the cutting disk of larger diameter.

A particularly favourable embodiment of a cutting means which is of particular simplicity consists of a cutting knife fixed within the range of the guide means and having a cutting edge positioned obliquely in relation to the driving direction, said cutting means being slidable and lockable in driving direction, and at least one pressure stirrup at least partly overlapping the cutting range of the knife. This arrangement makes it possible to select the most favourable cutting position even at adjustable row width.

Depending upon the infeed means of the harvesting machine, it may be of advantage to arrange the adjacent pick-up wheels with their axes of rotation inclined toward one another, with their geometrical axes intersecting or crossing one another above or below the pick-up wheels. The position of the pick-up wheels, in particularly in relation to one another, essentially predetermines the position of the crop in conveying and in transfer, so that the selection of a suitable inclination of the stream of crop favourably influences the course of same, with good results in regard to throughput and mechanical efficiency.

For adjustment of the apparatus to various widths of the rows in which the crops are grown, it is of particular advantage to arrange each pick-up wheel together with the associated guide means and the associated cutting means spacially laterally and/or longitudinally adjustable in relation to the adjacent pick-up wheel and/or each associated guide means spacially adjustable and lockable in at least two positions in relation to the pick-up wheel.

For adjustment of the pick-up wheel to various row widths and/or stalk thicknesses, it is of advantage to provide for each pick-up wheel to be pivotable and lockable with its axis of rotation around a point of rotation which is positioned behind the axis of rotation in relation to the driving direction and preferably coincides with a next-lying, upright driving shaft, or around a point of rotation which is positioned in front of the axis of rotation in relation to the driving direction.

For better adaptation of the pick-up apparatus to different infeed means of harvesting machines, it is of advantage to arrange the adjacent pick-up wheels in front of a conveying means consisting of uprightly arranged pick-up drums and/or an endless belt rotating around upright axes of rotation and/or a conveyor screw arranged transversely to the driving direction.

For a proper transfer of the plant stalks from the pick-up wheels to the infeed means arranged behind or to the conveying means, it is of particular advantage when the adjacent pick-up wheels at least partly overlap with at least their projections, tines or the like, parts, preferably the intermeshing parts of uprightly arranged pick-up drums of the infeed means arranged behind.

When using the apparatus according to the invention in a maize harvesting machine with essentially vertical infeed rolls, it is of advantage that the axial extension of the adjacent pick-up wheels be less than the axial height of the pick-up drum or the infeed rolls together with the cover of the conveying means arranged behind, so as to form a dumping table.

The invention is described in the following by means of various embodiments under reference to the accompanying drawings.

Figure 1 shows a partly sectional, partly diagrammatic side elevation of the embodiment according to the invention of the apparatus;

Figure 2 is a plan view of the apparatus according to Fig. 1;

Figure 3 a slightly modified embodiment of the apparatus according to the invention in enlarged scale in section through the common wheel axis plane along line III–III in Fig. 4;

Figure 4 a section along line IV–IV in Fig. 3;

Figure 5 a different embodiment of the apparatus according to the invention diagrammatically in side elevation, partly in section;

Figure 6 the embodiment according to Fig. 5 in plan view and partly in section;

Figure 7 a further embodiment of the apparatus according to the invention in elevational side view;

Figure 8 the embodiment according to Fig. 7 in plan view and partly in section;

Figure 9 another embodiment of the apparatus according to the invention in side elevation, partly in section and

Figures 10 and 11 two embodiments of the apparatus according to the invention with further conveying elements in plan view.

Fig. 1 and 2 show an apparatus according to the invention attached to the front face of a maize chopper. The apparatus is provided with two pick-up wheels 1, 2 driven in opposite directions and intermeshing and overlapping one another, having tines 10 bent counter to the rotating direction, the respective associated guide means 3, 4 and the cutting means 8, 9 associated to each pick-up wheel 1, 2; the drive is effected by means of a chain drive from below, from the infeed means of the maize chopper. The pick-up wheels are cased in by a cover which merges in driving direction F into a central stalk divider 17. The guide means 3, 4 is formed as part of the respective stalk divider 28, 28′. The pick-up wheels 1, 2 are positioned rotatably around axes of rotation 11, 12 which are parallel in relation to one another and inclined in the driving direction F and provided with three each wheel disks 13, 14, 15 consisting of the tines 10 and attached to the pick-up wheel

shaft, with a following cutting disk 29, 29′ attached below the wheel disks in the range between pick-up wheel 1, 2 and guide means 3, 4, said cutting disk cooperating with a further cutting disk 30, 30′ rotatably positioned within the range of the associated guide means 3, 4 around an axis parallel to the axis of the pick-up wheel and made to follow by means of frictional engagement with the cutting disk 29, 29′. For this purpose, the cutting disks 30, 30′ are pressed by means of pressure springs against the cutting disks 29, 29′. The axis of rotation of the cutting disks 29, 29′, 30, 30′ are all positioned in one plane A–A.

The guide means 3, 4 is guided along a small part, preferably about one sixth to one quarter, of the circumference of each pick-up wheel counting from axis A on, with a slight distance 7 remaining between the circumference 5, 6 of the pick-up wheel 1, 2 and the guide means 3, 4. The guide means 3, 4 is provided with a vertical wall extending in driving direction. Rearward, the guide means 3, 4 extends up to the immediate range of the infeed means of the maize chopper.

In the embodiment according to Fig. 3 and 4, the pick-up wheels 1, 2 driven in opposite directions are provided with tines 10 extending in radial direction and bent back on their ends counter to the rotating direction X and Y, respectively, with associated tines of various wheel levels or wheel disks arranged in axial direction precisely one above the other, i.e. aligned. In this embodiment, two wheel disks 44, 44′, 45, 45′ are arranged one above the other, between them stripping means 22, 22′, 23, 23′ are attached and extending from the points of attachment 24, 24′ in front of the pick-up wheels 1, 2 up to a point of attachment 25 positioned in the central plane XI between the pick-up wheels 1, 2 and behind these in driving direction F.

The associated guide means 3, 4 is guided from a range 26, 26′ in front of the plane of the wheel axis along the pick-up wheels 1, 2 and ends in the immediate range of the pick-up drums 37, 37′ of the conveying means of the pick-up apparatus or the infeed means of the maize chopper. The pick-up drums are positioned with their axes of rotation as parallel as possible in relation to those of the pick-up wheels 1, 2, as this simplifies the drive via the chain drive 18 (Fig. 1) from the obliquely opposite pick-up drums. The pick-up drums 37, 37′ are provided over a portion of their extension in radial direction with intermeshing or overlapping elements 40 which are overlapped by the tines 10 of the respective associated pick-up wheel 1, 2, which allows for a particularly firm gripping of the plant stalks.

An elastic guide element 27, 27′ extends from a point or a spot 26, 26′ on the guide means 3, 4 rearward in driving direction and tapers backwards crossing the operational range of the tines 10. The large cutting disks 29, 29′ of the cutting means, which are of approximately the diameter of the tine circles 10 of the pick-up wheels 1, 2, engage the smaller cutting disks 30, 30′, the smaller cutting disks 30, 30′ being pressed against the larger cutting disks 29, 29′ by means of spring force (Fig. 3).

Adjustment of the row width can be achieved by pivoting the pick-up wheels 1, 2 together with the guide means 3, 4 and the cutting means 8, 9 around the respective, closest-lying axes of rotation 33, 33′ of the pick-up drums 37, 37′ arranged behind or around the axes of rotation 33, 33′ of the obliquely opposite pick-up drums 37, 37′, in which case the effective chain length can be changed by means of a known chain tension adjuster not shown.

A further possibility for adjustment consists in forming the pick-upwheels 1, 2 pivotable in relation to one another around a point positioned in front of the axes of rotation 11, 12, for instance 35 (Fig. 4).

Fig. 5 and 6 show a further embodiment in which the pick-up wheels 1, 2 are provided with coaxial wheel disks 13, 14, 15 which are arranged one above the other in relation to the axis of rotation 11, 12 and whose diameter increases from the top to the bottom, so that plant stalks of strongly inclined position can be introduced into the infeed means of a maize chopper arranged behind. The associated guide means 3, 4 is situated in this case within the range of the circumference 5, 6 of the respective pick-up wheel 1, 2 at approximately equal distance 7. (Fig. 5).

A further embodiment of the invention is represented in Fig. 7 and 8; this embodiment differs from the one previously described in that elastic clamping bodies 21, 21′ resulting in a firm gripping of the plant stalks of different thickness are provided between adjacent wheel disks 44, 44′, 45, 45′ of the pick-up wheels 1, 2. In this embodiment, the cutting means 8, 9 is also of different construction and consists of cutting knives 31, 31′ ridigly attached between guide means 3, 4 and pick-up wheels 1, 2 and cooperating with cutting disks 29, 29′, the cutting edges 53, 53′ of the cutting knives 31, 31′ being arranged obliquely in relation to the driving direction F and their cutting range being partly overlapped by one each pressure stirrup 32, 32′. The cutting knives 31, 31′ are further provided with elongated holes which are penetrated by screws or the like 54 by means of which the cutting knives 31, 31′ are attached to a bracket in the guide means 3, 4. Due to the provision of the elongated holes, the cutting knife 31, 31′ is slidable and lockable within a range in driving direction F. The guide means 3, 4 is positioned close to the infeed means of a maize chopper so that

the pre-pressing rolls 41, which are rotatably positioned around axes of rotation of essentially horizontal situation, come tightly against the periphery 5, 6 of the pick-up wheels 1, 2.

The arrangement of the pick-up wheels 1, 2 which is shown in Fig. 9, with the geometrical axes 11, 12 of the wheels intersecting above same, allows the lifting up of the plant stalks and their conveying to an infeed means positioned at a higher level. The cutting disks 29, 29′ or their associated cutting knives 30, 30′ retain their position in this, while the pick-up wheels 1, 2 rotate either towards each other or away from each other, depending upon the position of their axes, which is made possible by means of universal couplings 11′, 12′.

Fig. 10 and 11 show embodiments having conveying means consisting for instance of a transverse conveyor belt 38 (Fig. 10) or a transverse conveyor screw 39 (Fig. 11) and being arranged at a slight distance behind the pick-up wheels 1, 2. In this case, the drive of the pick-up wheels 1, 2 is tapped from the conveyor means. These figures also show, in a general manner, the adjustability of the row width which is achieved by forming the pick-up wheels 1, 2 together with their guide means 3, 4 and their cutting means 8, 9 or at least part thereof laterally slidable or pivotable. The row dividers between pairs of intermeshing pick-up wheels 1, 2, 1′, 2′ are also provided divided in this case.

The invention is not limited in its application to maize choppers having vertical or horizontal infeed means or pre-pressing rolls or to maize picking implements, but can also be used for any other, similar type of agricultural implement.

The invention is not limited to the disclosure of the specification and/or the claims, within the scope and without departing from the spirit of the invention, changes and modifications are possible.

CLAIMS

1. An apparatus for picking up, cutting off and conveying stalked crops grown in a plurality of rows, to the infeed means of a harvesting machine the apparatus comprising two driven pick-up wheels of upright axes of rotation arranged side by side in driving direction and provided on their peripheries with projections, with one guide means and one cutting means associated to each pick-up wheel, said guide means being guided along a part of the periphery of the pick-up wheel at a distance which is small as compared to the diameter of the pick-up wheel and each guide means being provided with an associated cutting means in the range betwen guide means and pick-up wheel swept by the projections, wherein the adjacent pick-up wheels are staggered in relation to one another in axial direction and intermesh partly over-lapping one another and that the guide means of each pick-up wheel is guided over an angle range of 60° to 90°.

2. An apparatus according to claim 1, wherein the pick-up wheels staggered in relation to one another in axial direction are inclined with their axes of rotation in driving direction.

3. An apparatus according to claim 1 or 2, wherein the pick-up wheels are provided with wheel disks of varying diameters along their axes, the wheel disks of larger diameter being positioned underneath when the plant stalks are introduced into the infeed means arranged behind at a wider angle in relation to the ground and the wheel disks positioned on top when the plant stalks are introduced at a steeper angle in relation to the ground.

4. An apparatus according to any one of the claims 1 to 3, wherein the pick-up wheels staggered in relation to one another in driving direction are individually driven by means of a low-positioned drive, preferably via identically rotating infeed organs of a rearwardly positioned infeed means of a harvesting machine.

5. An apparatus according to any one of the claims 1 to 4, wherein the pick-up wheels staggered in relation to one another in driving direction are provided on their outer peripheries with radial tines or the like bent or angled counter to the rotating direction, with the projections, tines or the like of different wheel planes of each pick-up wheel preferably being arranged in axial direction one above the other.

6. An apparatus according to claim 5, wherein between adjacent wheel planes of the pick-up wheels staggered in relation to one another in driving direction, at least one each, optionally following, clamping body, in particular hollow body, per pick-up wheel is arranged, said body being elastic and resilient and essentially surrounding the axis of rotation and preferably extending into the range of the projections, tines or the like.

7. An apparatus according to any one of the claims 1 to 6, wherein stripping means are associated to the pick-up wheels. said stripping means extending into the central plane between pairs of intermeshing pick-up wheels and starting out from points positioned in driving direction in front of the axis of rotation and optionally within the circle of circumference of the roots of the tines or the like up to a point positioned behind the axis of rotation and within the range of the circle of circumference of the tips of the tines or the like and between the adjacent wheel planes of each pick-up wheel.

8. An apparatus according to any one of the claims 1 to 7, wherein the guide means is situated behind the plane of the axis of rotation of the pick-up wheel positioned essentially vertically in relation to the driving direction over a quarter at the most of the wheel circumference of the pick-up wheel and is

optionally extended in the direction of the rearwardly positioned infeed means of a harvesting machine.

9. An apparatus according to any one of the claims 1 to 8, wherein the guide means is provided with at least one elastic guide element in the circumferential range of the associated pick-up wheel, said elastic element at least partly crossing the circumferential range and at least partly extending counter to the driving direction.

10. An apparatus according to any one of the claims 1 to 9, wherein the adjacent pick-up wheels are arranged with their axes of rotation inclined toward one another, with their geometrical axes intersecting or crossing one another above or below the pick-up means.

11. An apparatus according to any one of the claims 1 to 10, wherein the adjacent pick-up wheels together with said guide means and said cutting means are spacially laterally and/or longitudinally adjustable in relation to the adjacent pick-up wheel and/or each associated guide means is spacially adjustable and lockable in at least two positions in relation to the pick-up wheels.

12. An apparatus according to any one of the claims 1 to 11, wherein the adjacent pick-up wheels are pivotable and lockable with their axes of rotation around points of rotation which are positioned behind the axes of rotation in relation to the driving direction and preferably coincide with next-lying, upright driving shafts.

13. An apparatus according to any one of claims 1 to 12, wherein the adjacent pick-up wheels are arranged in front of a conveying means respectively consisting of uprightly arranged pick-up drums and/or an endless belt rotating around upright axes of rotation and/or a conveyor screw arranged transversely to the driving direction.

14. An apparatus according to any one of the claims 1 to 13, wherein the adjacent pick-up wheels at least partly overlap at least with their projections, tines or the like, parts, preferably the intermeshing parts of uprightly arranged pick-up drums of the rearwardly arranged infeed means.

15. An apparatus according to any one of the claims 1 to 14, wherein the adjacent pick-up wheels are of an axial extension which is less than the corresponding axial height of the pick-up drum or of the infeed rolls together with the cover of the rearwardly arranged conveying means.

16. An apparatus according to any one of the claims 1 to 15, wherein the adjacent pick-up wheels are provided with a cutting means consisting of rotating cutting disks, with cutting disks of larger diameter being arranged on the axes of rotation of said pick-up means and cutting disks of smaller diameter being arranged within the range of the guide means and positioned rotatably around a stationary axis on the apparatus body and engagingly overlapping the cutting disk of larger diameter.

17. An apparatus according to any one of the claims 1 to 16, wherein the adjacent pick-up wheels are provided with a cutting means consisting of a cutting knife fixed within the range of the guide means and having a cutting edge positioned obliquely in relation to the driving direction, with at least one pressure stirrup at least partly overlapping the cutting range of the knife being associated to the knife.

18. An apparatus as hereinbefore described with reference to the accompanying drawings.

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Paper No. 17

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Ex parte NORBERT WOLTERS and RICHARD WÜBBELS

Appeal No. 2005-0352
Application No. 09/727,134

ON BRIEF

Before COHEN, NASE, and BAHR, Administrative Patent Judges.
NASE, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal from the examiner's final rejection (mailed June 27, 2002) of claims 1 to 7, 20 and 21. Claims 8 to 13, 15 and 17 to 19, which are the only other claims pending in this application, have been objected to as depending from a non-allowed claim.

We AFFIRM-IN-PART and REMAND.

BACKGROUND

The appellants' invention is directed to a feeding and picking device for an agricultural crop having a feeding element that has a vertical axis of rotation (specification, p. 1). A copy of the claims under appeal is set forth in the appendix to the appellants' brief.

The prior art references of record relied upon by the examiner in rejecting the appealed claims are:

Thompson	2,777,267	Jan. 15, 1957
Pottinger et al. (Pottinger)	GB 2 012 154 A	July 25, 1979
Wiegert[1]	WO 99/03323	Jan. 28, 1999

Claims 1 to 4, 20 and 21 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Wiegert.

Claims 5 to 7 stand rejected under 35 U.S.C. § 103 as being unpatentable over Wiegert in view of Thompson and Pottinger.

[1] In determining the teachings of Wiegert, we will rely on the translation of record provided by the USPTO.

Rather than reiterate the conflicting viewpoints advanced by the examiner and the appellants regarding the above-noted rejections, we make reference to the answer (mailed July 26, 2004) for the examiner's complete reasoning in support of the rejections, and to the brief (filed November 13, 2002) for the appellants' arguments thereagainst.

OPINION

In reaching our decision in this appeal, we have given careful consideration to the appellants' specification and claims, to the applied prior art references, and to the respective positions articulated by the appellants and the examiner. As a consequence of our review, we make the determinations which follow.

The anticipation rejection

We will not sustain the rejection of claims 1 to 4, 20 and 21 under 35 U.S.C. § 102(b) as being anticipated by Wiegert.

To support a rejection of a claim under 35 U.S.C. § 102(b), it must be shown that each element of the claim is found, either expressly described or under principles of inherency, in a single prior art reference. See Kalman v. Kimberly-Clark Corp., 713

F.2d 760, 772, 218 USPQ 781, 789 (Fed. Cir. 1983), cert. denied, 465 U.S. 1026 (1984).

The appellants argue (brief, pp. 3-4) that Wiegert does not disclose a rotating feeding element that grasps plant stalks and directs the plant stalks to a picking device which separates useable parts from plant stalks as recited in claims 1 to 4, 20 and 21. We agree. In that regard, the chopping unit 21 of Wiegert does not **grasp** plant stalks and direct the plant stalks **to a picking device**. Likewise, the feed chains 18, 19 of Wiegert do not **grasp** plant stalks and direct the plant stalks to a picking device. Accordingly, claims 1 to 4, 20 and 21 are not met by Wiegert.

For the reasons set forth above, the decision of the examiner to reject claims 1 to 4, 20 and 21 under 35 U.S.C. § 102(b) is reversed.

The obviousness rejection

We sustain the rejection of claims 5 to 7 under 35 U.S.C. § 103 as being unpatentable over Wiegert in view of Thompson and Pottinger.

In the final rejection (pp. 4-5) and the answer (pp. 4-5), the examiner set forth his rationale as to why dependent claims 5 to 7 were unpatentable over the applied prior art.

The appellants have not specifically contested this rejection in the brief apart from these claims' dependency from claim 1. In the obviousness rejection before us in this appeal, the examiner determined that it would have been obvious at the time the invention was made to a person of ordinary skill in the art to have replaced Wiegert's feed chains 18, 19 with tined wheels as taught by Pottinger and Thompson. The appellants have not pointed out how the claimed subject matter distinguishes from the so-modified device of Wiegert. Accordingly, we summarily sustain the rejection of claims 5 to 7 under 35 U.S.C. § 103.

REMAND

We remand the application to the examiner to consider if the combination of Wiegert in view of Thompson and Pottinger as applied in the affirmed rejection of dependent claims 5 to 7 is applicable to claims 1 to 4, 20 and 21.

CONCLUSION

To summarize, the decision of the examiner to reject claims 1 to 4, 20 and 21 under 35 U.S.C. § 102(b) is reversed; and the decision of the examiner to reject claims 5 to 7 under 35 U.S.C. § 103 is affirmed. In addition, we have remanded the application to the examiner for further consideration.

This application, by virtue of its "special" status, requires immediate action, see MPEP § 708.01.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED-IN-PART; REMANDED

IRWIN CHARLES COHEN
Administrative Patent Judge

JEFFREY V. NASE
Administrative Patent Judge

JENNIFER D. BAHR
Administrative Patent Judge

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